ARCHAEOLOGICAL INVESTIGATIONS AT TOSAWIHI, A GREAT BASIN QUARRY

Part 2: A Regional Survey

by

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April 1992

ABSTRACT

The Bureau of Land Management, Elko Resource Area, has requested that an environmental impact statement be prepared in anticipation of the expansion of mining activities by Ivanhoe Gold Company in the Ivanhoe Mining District, Elko County, Nevada.

As one contribution to that environmental analysis, Intermountain Research has completed a sample survey of 28,480 acres coterminous with a Tosawihi Quarries National Register District proposed by Rusco (1983), excluding areas previously examined. The purposes of the survey were to aid an assessment of the appropriateness of the proposed National Register district boundaries, to provide baseline data for an assessment (presented elsewhere) of cumulative effects on cultural resources lying within the study area, and to gather archaeological data that address activity patterns associated with prehistoric use of Tosawihi beyond the core Quarries (site 26Ek3032) area. Analyses of survey data were driven by testable propositions derived from earlier Intermountain Research work at Tosawihi Quarries. The results of these investigations are reported here.

Complete coverage of 2,929 acres (10.3% of the study area) was attained, and 61 discrete mapped silicification zones within, or just beyond, study area borders were examined. A judgmental survey of 17 springs also was undertaken. Two hundred and thirty-six prehistoric and historic features were recorded in the course of the survey.

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ACKNOWLEDGEMENTS

The Class II archaeological survey reported here was directed by Melinda Leach and supervised by Steve Botkin. Robert G. Elston, Christopher Raven, and Eric Ingbar contributed initial project planning and have provided creative insights along the way; Ingbar crafted the sample design. Leach, Botkin, Kathy Ataman, Kris Carambelas, and Ingbar developed field recording methods and, with Elston and Raven, participated in discussions about the Tosawihi production sphere.

Leach, Botkin, and Carambelas served as crew leaders, and able field technicians included Kathy Ataman, Doug Bird, Caitlin Carroll-Carambelas, Dan Dugas, Lynn Rogers, Susan Stornetta, and Kerry Varley. Evangeline Elston, *chef extraordinaire*, fed us well and kept the field camp running at peak efficiency. Jana Hembree, Bird, and Carroll-Carambelas were tireless post-field assistants, preparing data summaries, entering data into the computer, and compiling UTMs.

Mary Rusco opened her Tosawihi survey files to us, and Nancy Wicker and Carol Marcio, of the Bureau of Land Management, Elko Resource Area, provided us with helpful hydrologic maps and data. In-field logistics and support were provided by Ed Lopez, Penny McPherson, Jeff Campbell, and Steve Diezel of Ivanhoe Gold Company.

The report was written by Leach and Botkin, and Rogers contributed the discussion on historic use of the region. Report production was facilitated by Kathy Nickerson; maps and other figures were prepared by Michael Drews and Evangeline Elston.

INTRODUCTION

The Bureau of Land Management, Elko Resource Area, is preparing an environmental impact analysis that addresses expanded mining activities proposed by Ivanhoe Gold Company (IGC) in the Ivanhoe Mining District, Elko County, Nevada. IGC requested that Intermountain Research complete a BLM Class II archaeological survey of the study area depicted in Figure 1. This report documents the results of that survey.

The Class II study area encompasses 28,480 acres (Figure 2) and subsumes several broad tracts of land that have been the subject of prior Intermountain Research investigations (cf. Elston, Raven and Budy 1987; Budy 1988; Raven 1988; Drews 1988; Intermountain Research 1988a, 1988b, 1988c; Elston 1989; Leach and Botkin 1991; Elston and Raven 1992). The formerly surveyed parcels contain the largest, most intensively exploited opalite quarries presently known in the Great Basin, the Tosawihi Quarries (26Ek3032).

In 1983, Mary Rusco prepared a National Register of Historic Places nomination for a Tosawihi Quarries National Register District, the boundary of which defines the sampling universe for the Class II survey reported here. The purposes of this survey were to aid an assessment of the appropriateness of the Rusco-proposed National Register district boundary, to provide baseline data for an assessment of cumulative impacts on cultural resources lying within the study area*, and to gather archaeological data that address activity patterns associated with prehistoric use of Tosawihi, beyond the core Quarries area.

The Class II survey, conducted between June 3 and June 26, examined 10.3% (2,929 acres) of the study area. As well, a judgmental survey of 61 discrete zones of opalite silicification and 17 springs within, or just beyond, study area borders was undertaken. Two hundred and thirty-six prehistoric and historic features were recorded in the course of the survey.

Data collection and analyses were driven by models and assumptions developed in our earlier work at Tosawihi (Elston and Raven 1992). After four seasons of testing and data recovery at 79 locales in and around the Quarries, we had learned a great deal about prehistoric economic behavior relative to the extraction and processing of lithic material. Still, a series of unanswered, yet nonetheless important, questions remained about the role of the Quarries and its peripheries in a larger geographic and economic system (Elston and Raven 1992): How did archaeological patterns recognized at the Quarries, largely motivated by intensive use of toolstone sources, relate to those existing in a larger upland regional context? Did the outlying uplands function as part of an *economic system* that supported exploitation of the Tosawihi Quarries? Did use of the uplands as a whole focus, explicitly, on heretofore unknown toolstone sources, on 26Ek3032 sources, or was some other suite of non-lithic resources inviting their occupation? Due to limitations in the size of the Class II study area, some of these questions must be addressed from a limited venue, but others are explored in detail.

The following report assesses the value of that portion of the Tosawihi uplands incorporated in our survey as a "lithic terrane" (cf. Elston 1992b), deals with the distribution of quarrying and non-quarrying activities, evaluates spatial and locational relationships between artifacts, features and environmental phenomena, and examines the economic effects of distance on reduction stage of lithic artifacts. It also speaks to the cultural resource management issue of Tosawihi Quarries National Register District boundaries.

*The cumulative impacts analysis is reported elsewhere (Burke and Moore 1991).

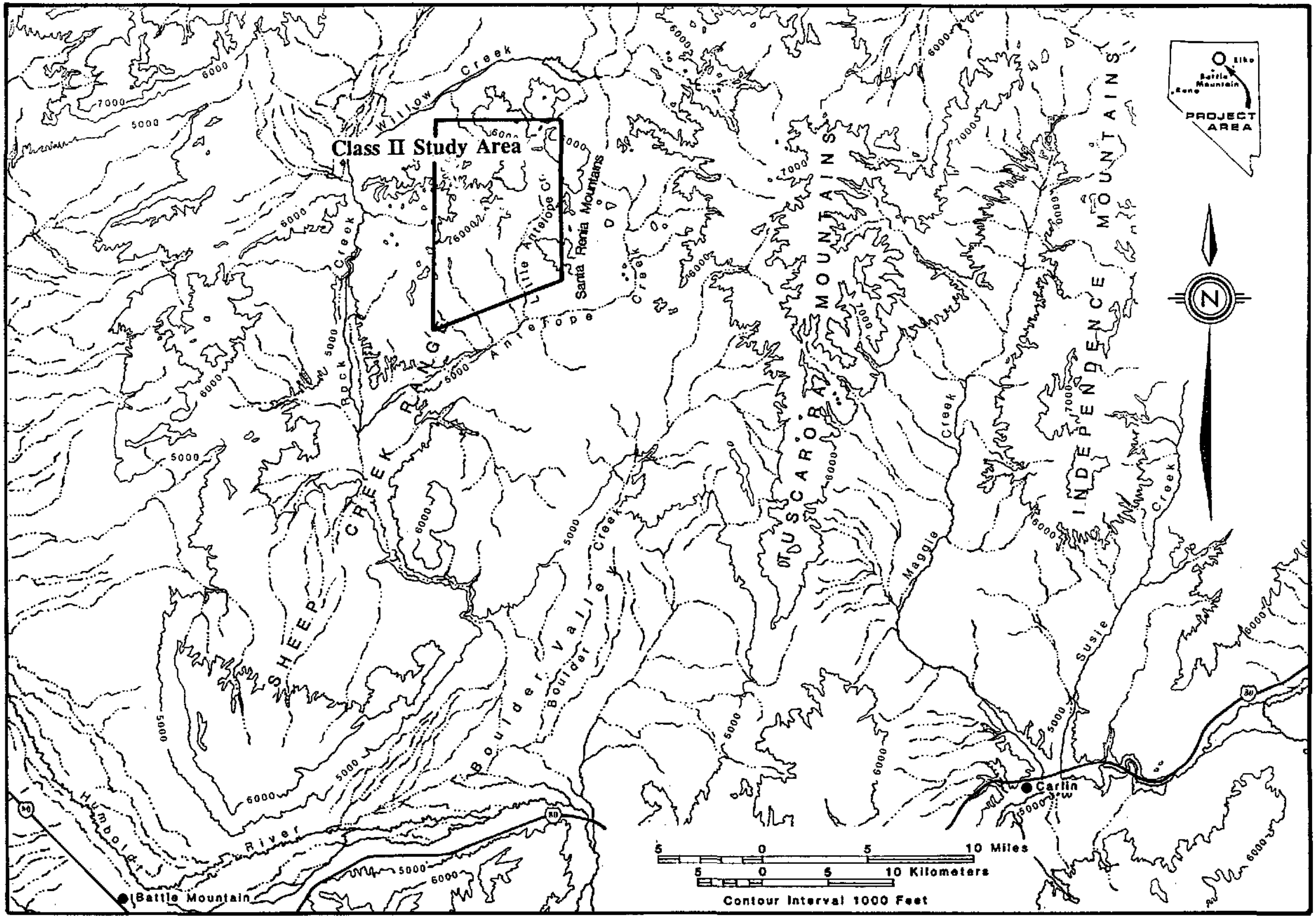

Figure 1. Project vicinity map.

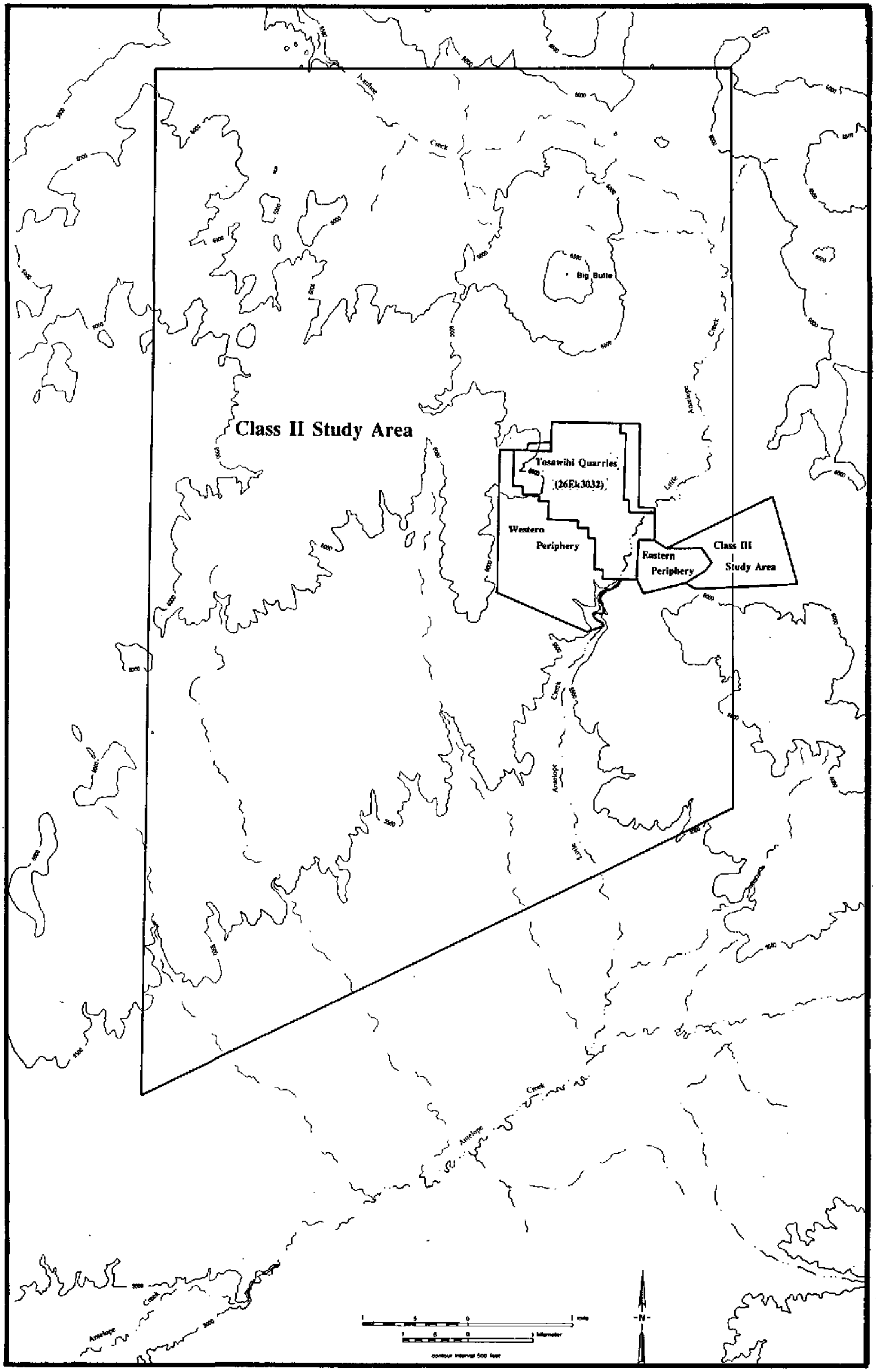

Figure 2. Map of the Class II study area, depicting previous Tosawihi surveys.

Chapter 1. THE NATURAL AND CULTURAL SETTING

The Tosawihi Quarries proper (that is, archaeological site 26Ek3032) and several contiguous tracts have been the focus of intensive archaeological research since 1987. For the most part, detailed discussions of environmental context generated as a consequence of those studies apply directly to the broader compass considered by the present work. The general presentation that follows is drawn largely from Elston and Raven (1992), the most comprehensive synthesis of local archaeological inquiry to date.

The Tosawihi Quarries National Register District and the Class II study area, which subsumes them, lie near the northern hydrographic limit of the Great Basin in north central Nevada (Figure 3), where they occupy a moderately dissected upland just north and west of the junction of the Sheep Creek Range and the Santa Renia Mountains. Minor perennial streams that eventually feed the Humboldt River (Willow Creek, Rock Creek, and Antelope Creek) flank the study area on the north, west, and south, respectively.

Rising abruptly northward from the alluvial flats along Antelope Creek, elevations in the project area range from 5300 to 6889 feet amsl and constitute a zone that is altitudinally and ecologically transitional between the Humboldt River plain at Battle Mountain (4500 feet amsl) located 61 km to the south, and summits in the Tuscarora Mountains (8500 feet amsl) that dominate the skyline 24 km to the north and east. Its intermediate position fosters local climatic conditions less severe than extremes recorded for the region as a whole, where mean monthly temperatures range from lows of -5° C in January to highs in July of 21° C and annual precipitation, falling primarily as snow, ranges between 10 cm and 40 cm (Houghton, Sakamoto and Gifford 1975; Brown 1960). Summers in the study area are short, dry, and hot, while winters are long, cold, and snow-bound often until late March.

It is the geological content of the project area rather than any of its biotic offerings that attracted human use of the place over the last ten millennia. Toolstone and/or minerals liberated from the local substrate and the leavings of those efforts to acquire them constitute virtually the entire archaeological record there, from prehistoric and historic times.

Geology and Landforms

For our purposes, the most direct impact on the effective Holocene landscape derives from Miocene events that sequentially placed 50-150 m thick volcanic deposits, first by the emanation of massive ashes, ash-flow tuffs and rhyolites, and then by the introduction of basaltic and andesitic flows (Fiero 1986:117-120; Coates 1987:68). During the late Miocene or early Pliocene, tuffs and ashes over an area of ca.130 km^2 in the immediate vicinity of Tosawihi were altered by hydrothermally-induced silicification. Subsequent dehydration and crystallization formed the vast beds of chert-like cryptocrystallines referred to as opalite (Bailey and Phoenix 1944). In his discussion of the lithic terrane of Tosawihi, Elston (1992b) describes the origin and evolution of bedrock stratigraphy and details the complex interplay of the physical properties of the local geology and the resulting archaeological record.

Today, this assortment of Miocene rocks dominates much of the surface geology of the study area and, with the exception of the opalite, of the north central portion of the Great Basin. Rhyolites from the initial wave of volcanism predominate throughout the eastern half of the study area (Cornucopia 1987). Comprising the highest landforms in the study area, they have weathered into prominent high domes or craggy, deeply incised highlands. Slopes almost everywhere in the rhyolite country of the study area are steep and in many places precipitous, save for where they are moderated by colluvial accumulations in the bottomlands of Big Butte Valley and along alluvial terraces fringing Ivanhoe and Little Antelope Creeks.

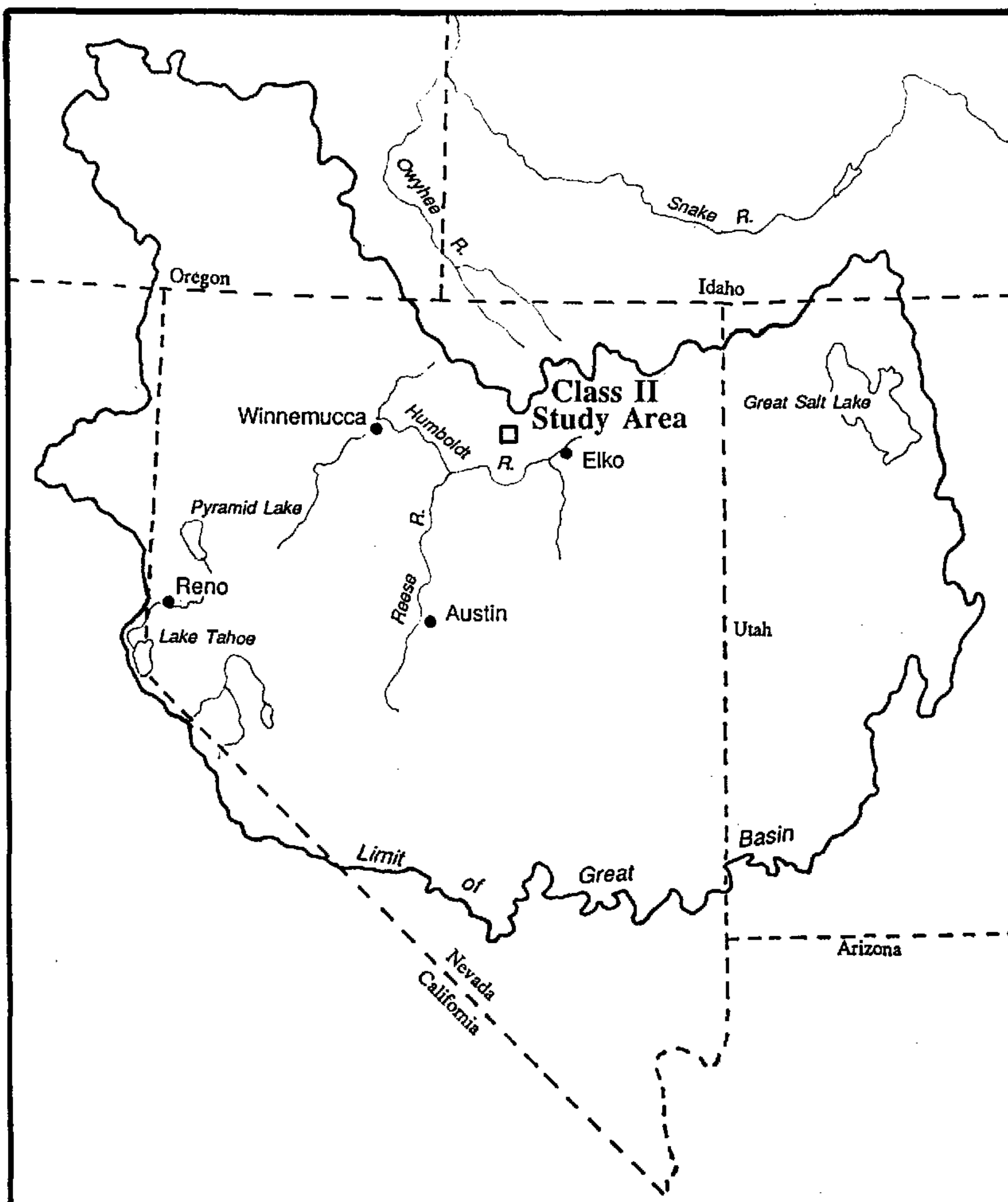

Figure 3. The place of the Class II study area in the Great Basin.

Less severe, more gently rolling topography prevails in the western half of the study area where basalt and softer undifferentiated tuffs comprise much of the bedrock. Here, these deposits typically are dissected into a series of parallel south-trending ridges and deep intervening stream channels that coalesce along their toe slopes near the southwestern limit of the study area to form a broad alluvial plain above Antelope Creek.

The younger rocks, introduced by flows of basaltic andesite, occur in more localized distributions. They form erosion-resistant ridgecrests capping the softer tuffs in the central and western portions of the area.

Beds of opalite-bearing altered tuffs, dipping 10-15 degrees southeast, span the full east/west dimension of the study area. Ranging in size from little more than boulder-sized outcrops to vast exposures that constitute locally prominent landforms of over several square kilometers as mapped by Cornucopia (1987), these deposits occur in virtually every quarter of the study area (Figure 4). Field inspection during survey, however, disclosed that many of these locations consist of tuffs insufficiently silicified to have provided knappable toolstone. Although outliers were encountered, exposures of workable opalite toolstone are most extensive and most densely distributed throughout a swath in the central portion of the study area proximal the Tosawihi Quarries site (26Ek3032).

Soils observed over much of the study area appear similar to those examined more closely during test excavations in and around the Tosawihi Quarries (cf. Elston and Dugas 1992). Most soils are colluvial products, silty to sandy loams derived from the in-place weathering of the bedrock. Coarseness of the matrix and incidence of gravels and other inclusions vary from place to place, largely as a function of slope and of depth and composition of the substrate. Colluvial soils are blanketed by accumulations of eolian silts in many locations, especially on the higher ridge crests and upper leeward slopes. This phenomenon has important archaeological consequences: excavation at several sites (e.g., 26Ek3184, 26Ek3192, 26Ek3198) in the vicinity of the Tosawihi Quarries revealed that these deposits have buried prehistoric cultural features. It seems likely that such deposition has occurred in the Class II study area, as well (cf. Botkin, Dugas, and Elston 1992).

On ridges defined by basaltic andesite flows, bedrock has weathered into platy slabs to form extensive pavements and talus stripes. Alluvial deposits in the principal drainages are often relatively deep and, in places, terracing is pronounced. Many stream channels are deeply entrenched and most are bottomed by rounded cobbles and boulders. Strata of Mazama tephra are exposed in cutbanks at several locations within and adjacent the study area and (with equivocal cultural association) were encountered during subsurface testing at two localities of the Tosawihi Quarries site (Leach and Botkin 1991).

Water

Water is scarce under present conditions in the study area. Deeply incised gorges, relict spring mounds, and Pleistocene stream deposits in the basal levels of stratigraphic sections of sites along principal drainages demonstrate the prevalence of wetter conditions in the remote past. However, little suggests that water ever was plentiful over most of the span of human presence in the vicinity.

Most of the area lies high on the local watershed, topographically isolated from the more generous aquifers that contribute to the comparatively lush settings of the Antelope Creek and Boulder Creek drainages (along the western foothills of the Tuscarora Mountains immediately east). Although bracketed by perennial tributaries of the Humboldt River, only ephemeral streams cross the study area (Figure 5). Ivanhoe Creek, Little Antelope Creek, and their influents drain the northwestern and southeastern halves of the area, and while they channel copious flows after snowmelt, they are dry by August. BLM hydrologists identify some fourteen springs and seeps in the study area (BLM Elko Resource Area, written communication). Based on field observations since 1987 and more focused scrutiny during Class II survey, most of these are ephemeral. Even those charged sufficiently to contribute to stream

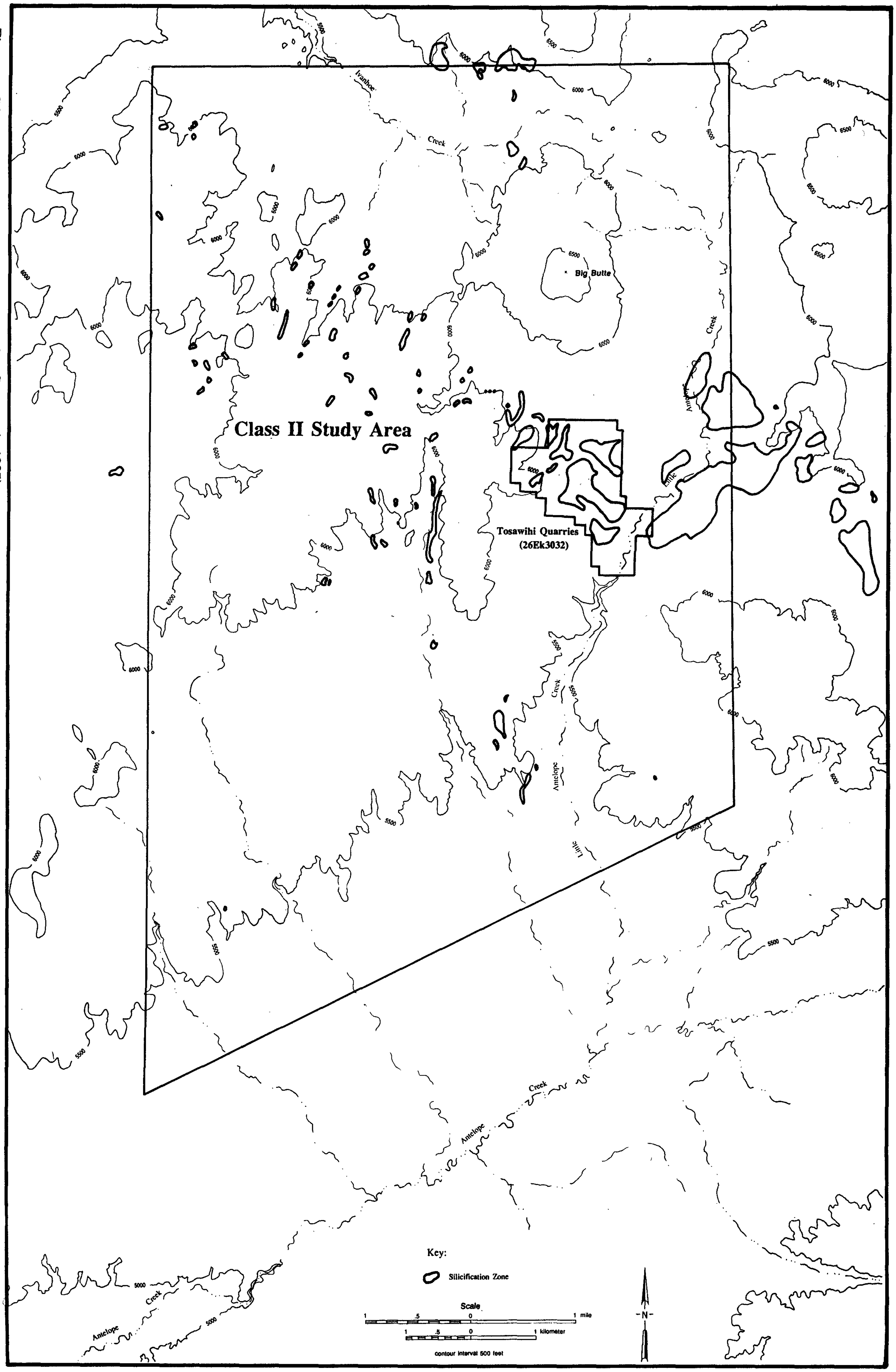

Figure 4. Silicification of the Tosawihi vicinity (after Cornucopia 1987).

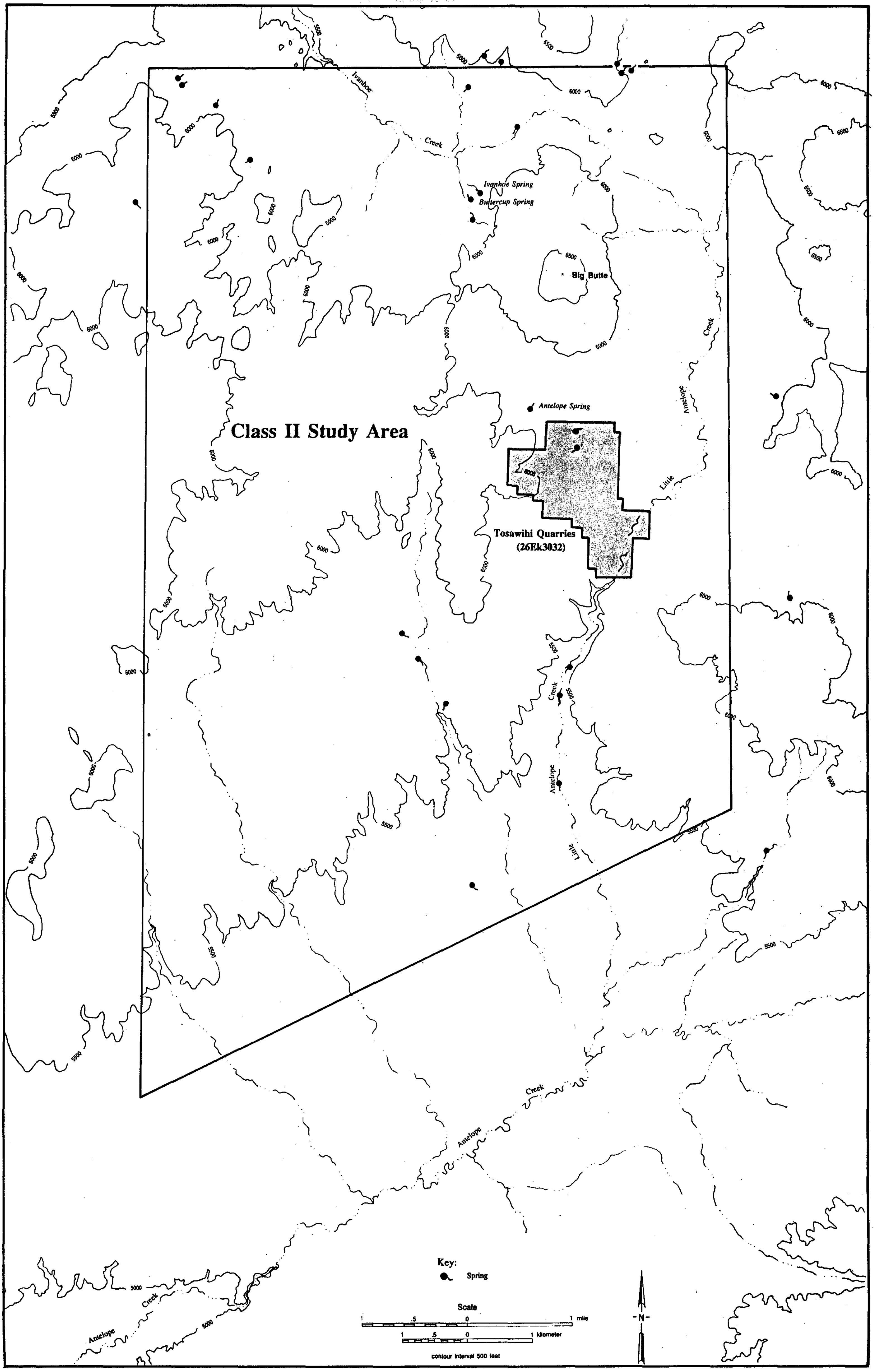

Figure 5. Water sources in the Tosawihi vicinity.

flow in May were moribund by late June. More persistent sources are rare. Most of these occur in the vicinity of Big Butte Valley in and around the northern extreme of the Tosawihi Quarry site.

Owing in large part to the paucity of water, biotic resources in the Tosawihi vicinity almost never appear to have offered prehistoric foragers subsistence opportunities that could not be pursued more effectively in the comparatively more game-rich, well-watered ecozones that surround it (cf. Raven 1992a; Schmitt, Ingbar, and Raven 1992:624).

Plants

Lying within the Artemisian biotic province, the study area occupies a mid-elevation sagebrush steppe. Essentially treeless except at a few locations, plant structure is characterized by an intricate edaphically-controlled mosaic of big sage and low sage communities. The big sage community, dominated by tall sagebrush (*Artemisia tridentata*) accompanied by a grass component of Great Basin wildrye (*Elymus cinereus*) and bluebunch wheatgrass (*Agropyron spicatum*), prevails in deeper soils of silty bottomlands and semi-shadowed northern ridge slopes. The low sagebrush community occurs associated with near-surface bedrock locations on knolltops, steeper slopes, and other settings where shallow soils predominate. Here, low sagebrush (*Artemisia arbuscula*), phlox (*Leptodactylon* sp.), squirreltail grass (*Sitanion hystrix*), and Idaho fescue (*Festuca idahoensis*) constitute the most commonly encountered species. At higher elevations in the northern and eastern quarters of the study area these communities are augmented by mountain shrubs of the Montane Zonal Series (Billings 1951: 113-119): bitterbrush (*Purshia tridentata*); and serviceberry (*Amelanchier alnifolia*). Some rocky barrens, especially in the rhyolite highlands east of Little Antelope Creek, support little vegetation other than clumps of cushion cactus (*Coryphantha vivipara*) and harlequin colonies of lichen.

Riparian assemblages are confined almost exclusively to the wettest most heavily shaded drainage bottoms and the most persistent springs. These settings include relatively lush but highly localized stands of wild rose (*Rosa* spp.), gooseberry (*Ribes aureum*), chokecherry (*Prunus virginiana*), serviceberry, and willow (*Salix* sp.).

Cattle graze throughout the study area. In zones most heavily grazed and/or most recently burned by wildfires (Big Butte Valley and contiguous areas to the west as well as the alluvial flats above Antelope Creek) large tracts presently are occupied by the alien cheatgrass (*Bromus* sp.) and native pioneer species, including rabbitbrush (*Chrysothamnus* spp.), mustard (*Brassica* sp.) and thistle (*Cirsium* sp.).

Local communities host several species of plant foods economically important to aboriginal foragers. In addition to the grasses listed above, we observed numerous forbs generally scattered diffusely throughout the area. These include several buckwheats (*Eriogonum* spp.), globe mallow (*Sphaeralca* sp.), Mentzelia, lupines (*Lupinus* spp.), larkspur (*Delphinium nuttallianum*), and bitterroot (*Lewisia rediviva*). However, as Raven (1992a) points out, under current ecological conditions and those reasonably inferred for the past, plant foods likely never formed the basis for prehistoric subsistence strategies within the project area and probably played minor roles in the diets of aboriginal quarriers.

Animals

The project area falls fully within Merriam's (1889) Upper Sonoran life zone, characterized over most of its extent by abundant and diverse faunal associations (cf. Hall 1946). Yet conditions of seasonal aridity and low plant productivity result in few animals being found here, compared to those available in the relatively lush riparian and higher altitude locations that surround the study area (Raven 1992a). No formal species census has been completed for the Tosawihi vicinity. Our knowledge of wildlife in the area, based on observations compiled over the last several years of fieldwork, is unquestionably incomplete.

At present, no large mammals reside permanently in the project area. The largest mammalian species, pronghorn antelope (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*), move into the Tosawihi vicinity soon after snowmelt. Although mule deer move in groups of as many as twenty individuals early in the season, they soon disperse to browse the later greening higher country elsewhere. Neither Big Horn Sheep (*Ovis canadensis*) nor elk (*Cervus canadensis*) inhabit the area today, but their occurrence in nearby ranges suggests the possibility of their presence prehistorically. Archaeological recovery of bison (*Bison bison*) bones and elk antler in the Tosawihi Quarry vicinity implies access to, if not the local presence of, an even larger food species in the past (cf. Schmitt 1992).

In contrast, small mammals abound in the region today. We suspect most species attributed by Hall (1946) to the high valley/foothill biomes of the region occur in the project area today or did so prior to the declining productivity that followed in the wake of cattle grazing (Raven 1992a). Ground squirrels (particularly *Spermophilus elegans nevadensis*) are abundant almost everywhere and occur at times in especially staggering numbers in and around Big Butte Valley. Other species observed include wood rat (*Neotoma cinerea*), pocket gopher (*Thomomys* sp.), cottontail rabbit (*Sylvilagus nuttallii*), pigmy rabbit (*Sylvilagus idahoensis*), jackrabbit (*Lepus townsendii* and *L. californicus*), chipmunk (*Tamias* sp.), marmot (*Marmota flaviventris*), badger (*Taxidea taxus*), kit fox (*Vulpes macrotis*), coyote (*Canis latrans*), and bat (order CHIROPTERA).

Linsdale (1936) discusses the avifauna of the region encompassing the study area. Confirmed sightings during fieldwork include bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), great horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), burrowing owl (*Speotyto cunicularia*), marsh hawk (*Circus cyaneus*), common raven (*Corvus corax*), loggerhead shrike (*Lanius ludovicianus*), cliff swallow (*Petrochelidon pyrrhonota*), western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), flicker (*Colaptes* sp.), mourning dove (*Zenaidura macroura*), poor-will (*Phalaenoptilus cunicularia*), killdeer (*Charadrius vociferus*), sage grouse (*Centrocercus urophasianus*), turkey vulture (*Cathartes aura*), and chukar partridge (*Alectoris chukar*), an introduced species.

A few dace (*Rhinichthys* sp.) seen in pools along Little Antelope Creek constitute the only fish observed by us in the project area. Raven (1992a) suggests that bigger fish important in prehistoric economies along the upper Humboldt (Lahontan cutthroat trout (*Salmo clarki henshawi*), Lahontan mountain sucker (*Pantosteus lahontan*), and Lahonton tui chub (*Siphateles bicolor*) came no nearer the project area than Rock Creek or Willow Creek (cf. La Rivers 1962:101-104).

Stebbins (1966) describes the reptiles and amphibians attributed to the region. We observed bull snakes (*Pituophis melanoleucus sayi*), western yellow-bellied racers (*Coluber constrictor mormon*), garter snakes (*Thamnophis* sp.), western rattlesnakes (*Crotalus viridis*), horned lizards (*Phrynosoma* sp.), side-blotched lizards (*Uta stansburiana*), and several varieties of spiny lizards (*Sceloporus* spp.). Leopard frogs (*Rana pipiens*) and tree frogs (Family Hylidae) were the only amphibians seen during fieldwork.

People

Drawing from baseline ethnographic and ethnohistoric works of Steward (1937, 1938, 1939, 1941), Harris (1940), and Powell and Ingalls (1874), Raven (1992a) summarizes current understanding of local aboriginal cultural context, economy and land use.

At the time Euroamerican trappers and explorers initially explored the area, in the first half of the nineteenth century, the reaches of the Humboldt River in the vicinity of Battle Mountain and adjacent uplands were inhabited by the *Tosawihi* ("White Knife") subgroup of the Western Shoshone. On the basis of linguistic evidence (Miller 1966, 1986), Western Shoshone entered the region in the course of a northward and eastward expansion of Numic speaking peoples that commenced some ten to fifteen centuries ago. This expansion culminated in the occupation of a vast area that today encompasses about half of the state of Nevada and contiguous portions of California, Idaho, and Utah (Figure 6). Earlier residents of the region, presumably displaced or absorbed by the newcomers, are known only from archaeological remains. Such remains reflect occupation of the area over the full span of documented human use of central northern Nevada (Elston and Drews 1992).

Initially, the name *Tosawihi* was used by ethnographers without specificity to refer to many groups in the region (Harris 1940:39; Powell and Ingalls 1874). But Steward (1938) advocated the name for those groups who wintered along the Humboldt River in the vicinity of Battle Mountain and whose foraging range subsumed the mountains around Rock Creek. The name is noteworthy for its symphony: Thomas et al. (1986:283) point out that it refers also to the high toolstone-quality lithic material that occurs in the mountains north of Battle Mountain (this almost certainly a reference to the opalite deposits in and around the Tosawihi Quarries; Raven 1992a).

Estimates of Tosawihi Shoshone population for the nineteenth century vary widely, from the Powell and Ingalls (1874) low of 194, to Harris's (1940:42) estimate of 800-1000 individuals. Most sources concur that the riparian corridor along the Humboldt River was densely populated (ca. one person per two square miles [Steward 1938:628]), but that beyond this comparatively lush zone density diminished to ca. one person per fifteen to twenty square miles (Harris 1940:42).

Steward (1938:161-162) and Harris (1940:44) report that in winter people settled in camps composed of two to ten related family groups, distributed in loose clusters along the Humboldt River. In summer these aggregates dispersed into individual family-based bands to forage within a 25-100 mile radius of the winter camps (Harris 1940:40-45). Ethnographic accounts offer little detail about aboriginal subsistence patterns. Steward (1938:162) describes forays as far to the south as the vicinity of present-day Austin for the procurement of pine nuts and northward to the forks of the Owyhee River for salmon. Although communal drives took antelope and rabbits, most subsistence chores were performed by individuals. From normative accounts at least, men were tasked with the acquisition of game, and women engaged in the collection of plant foods.

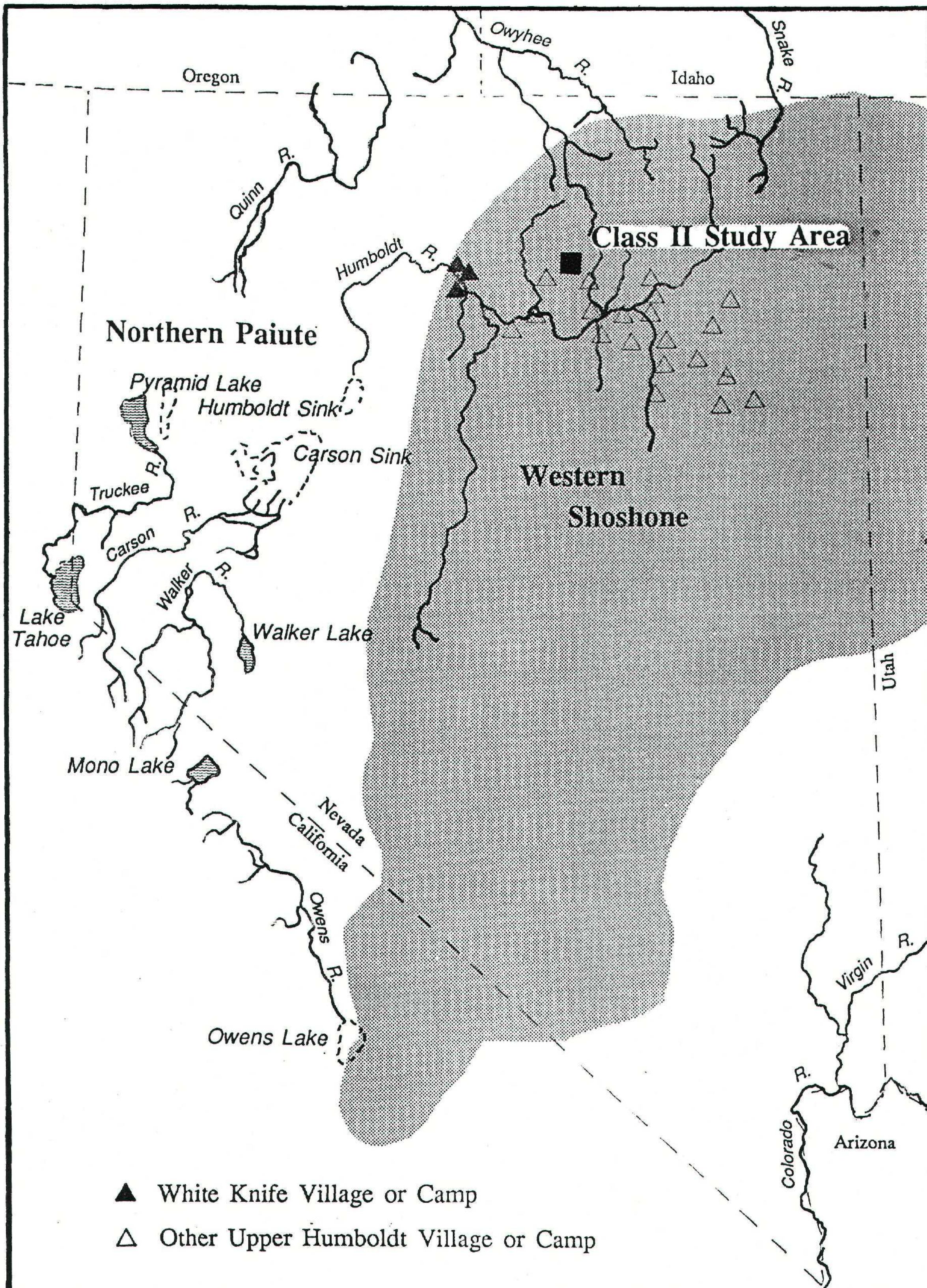

Figure 6. Western Shoshone Territory (after Steward 1937, 1938).

Chapter 2. PREVIOUS ARCHAEOLOGICAL RESEARCH

Several syntheses of the archaeology of the western Great Basin (Elston 1986), northern Nevada (James 1981; Smith et al. 1983), and the Humboldt River Basin (Elston and Budy 1990; Rusco 1982) provide a broader framework within which the archaeological record of the project vicinity may be considered (Figure 7). The perspective provided by these studies, as well as the results of site-focused work in central northern Nevada to date, are detailed in discussions by Raven (1992a).

To summarize, earlier work in the region discloses the wide distribution of Tosawihi chert over a broad area north of the Humboldt River, roughly congruent with the ethnographic territory of the Western Shoshone between the Osgood Mountains and Elko (Rusco 1979:2). White chert raw material dominates assemblages at sites along the Humboldt River (Stephenson and Wilkenson 1969; Rusco 1976b, 1979, 1982), and in upland settings north of the river (Crittenden and Elston 1981; Elston et al. 1981; Clay and Hemphill 1986). Recent mining-related cultural resource management studies in Boulder Valley and the western foothills of the Tuscarora Mountains report an overwhelming preponderance of white chert in lithics assemblages (Hicks 1989; Rafferty and Blair 1988; Russell, Tratebas, and Schroedl 1986; Tipps 1989). Much of this material may be attributed to Tosawihi sources, based on results of ultraviolet fluorescence examination of a sample of these assemblages (Ataman and Botkin 1991; Elston 1992c). Tosawihi-like raw material is reported from as far as 150 km north of the Quarries in the Snake River Plain (Rusco 1979, citing personal communication from Don Crabtree) and from Gatecliff Shelter (Novick 1987) in the Monitor Range to the south of Tosawihi.

Despite continuous knowledge (and use) of the place by the Tosawihi themselves (Rusco and Raven 1991) and ethnographic references to the toolstone sources there since the time of Steward's (1941) work, the Tosawihi Quarries did not become the direct focus of archaeological study until Mary Rusco began fieldwork there in the mid-1970s. Rusco and her colleagues were first to map and describe the Quarries (Rusco 1976a, 1976b, 1979) and to recognize the important role played by opalite procured at Tosawihi in the prehistoric economies of the Humboldt River Basin (Davis, Fowler, and Rusco 1976; Rusco 1978,1982; Rusco and Davis 1979, 1987; Rusco and Seelinger 1974; Rusco, Davis, and Jensen 1979; Rusco et al. 1982). In 1983, Rusco prepared a National Register of Historic Places nomination for Tosawihi.

A decade after Rusco's work, minerals development in the Ivanhoe Mining District has inspired intensified and accelerated scrutiny of the local prehistoric record. The Tosawihi Quarries site and contiguous zones have been the focus of federally mandated archaeological study by Intermountain Research since 1987. Cultural resource management work there commenced with intensive reconnaissance of the Quarries proper (Elston, Raven and Budy 1987) and adjacent lands to the west (the Western Periphery; Budy 1988), east (the Eastern Periphery; Raven 1988), and north (the Northern Corridor; Drews 1988). Subsequently, phased testing and data recovery programs were undertaken at 79 archaeological locations in and around site 26Ek3032 (Intermountain Research 1988a, 1988b, 1988c; Elston 1989; Leach and Botkin 1991). The most detailed and comprehensive presentation of the results of inquiry to date are provided by Elston and Raven (1992).

At this writing, archaeological investigations at Tosawihi continue. Analysis of data garnered during excavation of a large quarry pit complex (Locality 36) in the Quarries currently is underway. Immediately before Class II fieldwork began, some 300 acres adjacent and east of the Quarries were examined by Class III-level survey, resulting in the recording of thirty-six previously undocumented prehistoric sites (Botkin 1991).

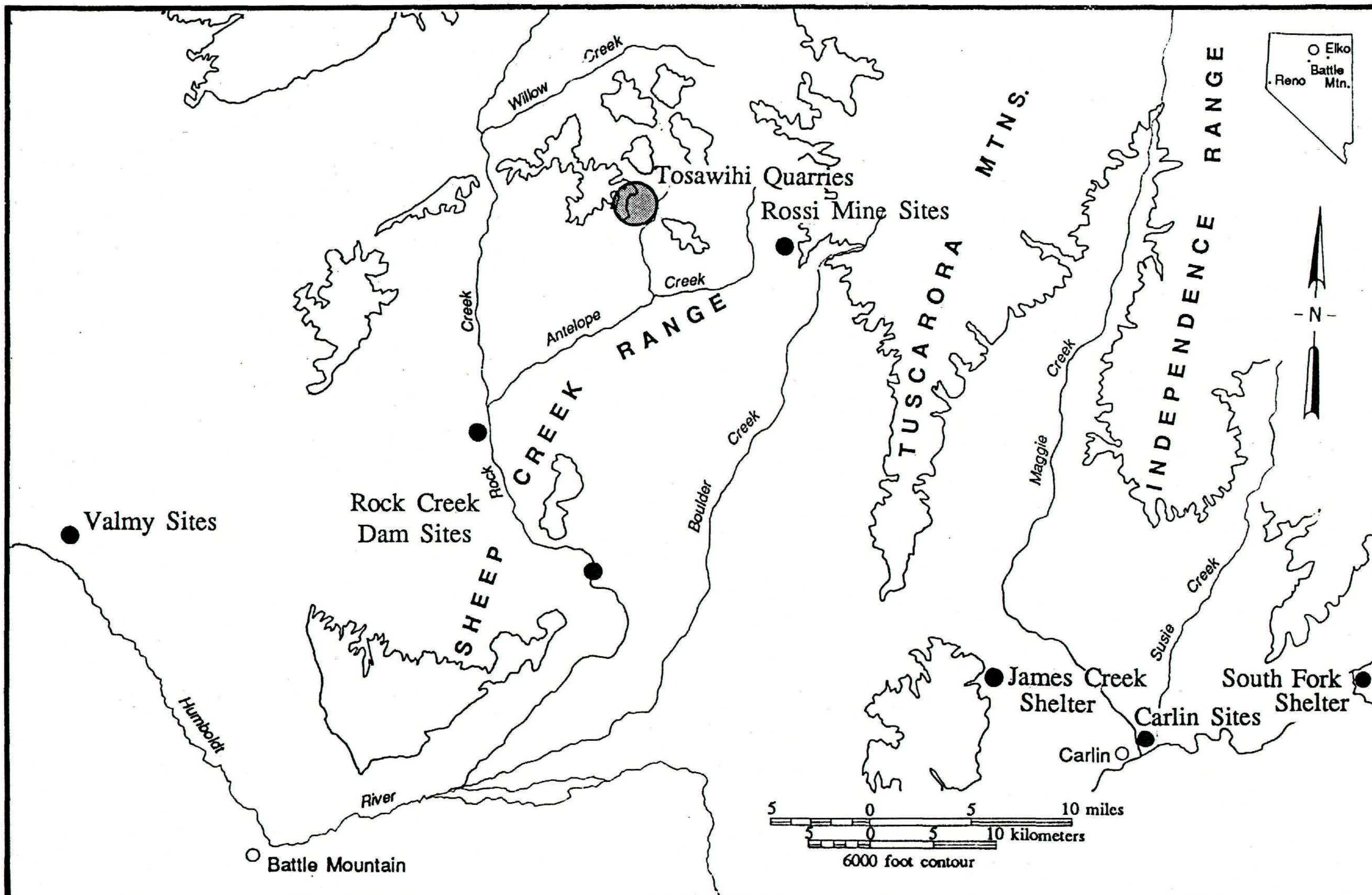

Figure 7. Locations of previous archaeological research in the Tosawihi vicinity.

Chapter 3. RESEARCH DESIGN

Exploitation of the Tosawihi Quarries region was driven largely by prehistoric acquisition of the high quality opalite toolstone that surfaces in massive mapped silicification zones there (Elston and Raven 1992). Even the off-quarry residential sites peripheral to the Quarries appear to represent the short-term encampments of small groups of people who came to Tosawihi to procure opalite toolstone. Evidence of non-lithic resource procurement and processing is rare, and the opportunities for such, given the paucity of plants and game in the region, appear to have been extremely limited (Schmitt, Ingbar, and Raven 1992). Indeed, all discrete archaeological remains investigated by Intermountain Research in its undertakings at and near the Quarries appear to relate directly to a complex system of prehistoric lithic production.

Descriptive and predictive models for the Tosawihi lithic production system have been outlined previously in detail (Elston 1988; Elston 1992a, c; Elston, et al. 1992). These models appeal to cost-minimization principles, employing optimization constructs from economics and behavioral ecology (Belovsky 1987; Stephens and Krebs 1986), and drawing upon experimental and ethnographic cost/benefit data. The result is a comprehensive consideration of how mobility patterns, labor organization, and procurement technology serve as strategies that can reduce overall lithic production costs and/or increase output.

Certain assumptions are inherent in such models, of course. We assume that hunter-gatherers were rational decision-makers who judged costs and benefits of lithic procurement and gauged risks, payoff, and losses (Elston 1992c). Further, having weighed such variables, we assume hunter-gatherers employed a flexible repertoire of organizational and technological options to meet changing circumstances. As conditions relating to access to toolstone, locations and distribution of food resources, seasonality, and social constraints varied, so too did their responses.

Toolstone procurement confers no direct caloric benefits, but it does consume time and energy that could be used for acquiring such benefits (Elston 1992a). Getting toolstone begins with searching for a source, then prospecting and assaying the toolstone follow. Extracting raw material can involve simply picking up surface rocks, or it may require excavation of soil to recover toolstone clasts or even costlier excavation of material from subsurface beds and outcrops. The processing or manufacture of transportable forms then involves decortication, contouring, reduction, and often heat-treatment. Each of these activities requires expenditure of energy and time.

Collecting and processing raw materials also carry with them a series of "opportunity costs" lost chances to acquire, process, or consume food or other non-lithic resources (Elston 1992c). Because lithic procurement effectively competes with other beneficial activities, we expect that hunter-gatherers will minimize the costs of getting and processing toolstone. So they will attempt to maximize efficiency by (1) minimizing labor costs in relation to yield or output, (2) minimizing loss of other potential benefits, and (3) minimizing distances travelled and over which quarried products are transported.

The efficient hunter-gatherer can minimize both labor/procurement costs and opportunity costs through scheduling, mobility, use of efficient quarrying techniques and tool design, and organizational decisions. Altering residential mobility (moving residences closer to toolstone sources), changing the shape or size of the annual range to include toolstone sources, arranging to be in the vicinity of usable sources when other resources are homogeneously available, employing efficient extraction techniques all are strategies for altering the cost of getting toolstone (Elston 1992c). Further, situating reduction and residential sites close to quarries and reducing toolstone bulk before transport are strategies for diminishing effort, travel, and transport costs (Raven 1992b; Bloomer and Ingbar 1992).

Research Propositions

The Class II data collection and analyses were designed explicitly to address propositions advanced in Elston and Raven (1992) and Elston et al. (1992), and to evaluate the role of the Tosawihi Quarries in a larger geographic context. The level of scrutiny afforded by surface reconnaissance cannot yield quantitative data directly comparable to intensive excavation (like that conducted at the Quarries and their peripheries). But we can evaluate qualitatively, if not quantitatively, several broad expectations anticipated by our previous Tosawihi investigations. What follows are research propositions and data expectations that organize subsequent analytical discussions.

Use of the Lithic Terrane

Variables that seem to have affected exploitation of toolstone sources at the main Quarries are toolstone quality, depth of colluvium over bedrock, proportion of high quality toolstone to waste rock, and convenience with regard to residences and potable water (Elston et al. 1992; Raven 1992b). Discrete silicification zones (as mapped by Cornucopia, 1987; see Figure 4) in the Class II study area should be used when they are sufficiently high in quality, accessible from residential locations, and situated conveniently near water. Even high quality sources will go unexploited, however, or will be less intensively exploited, if their location relative to water and potential campsites is unfavorable (Elston et al. 1992).

The spatial distribution of opalite products originating at the Tosawihi Quarries will be examined in order to assess the magnitude of a Tosawihi "zone of production". This analysis will enable us to evaluate the appropriateness of the proposed (Rusco, 1983) National Register District boundary.

The Character and Distribution of Formed Artifacts and Debitage

The *intensity* of quarry-related activity, manifest in densities of quarrying features, quarrying tools, and byproducts, and of early stages of lithic production (bifaces and debitage), should be related directly to distance from toolstone sources, and should diminish as distance from toolstone sources increases (Elston et al. 1992). Because transportation costs vary directly with distance and weight of the load (Jones and Madsen 1989), eliminating substantial toolstone mass before transport reduces the cost of getting usable toolstone to its destination (Elston et al. 1992). Early stages of reduction therefore should be undertaken at or near the stone source. The relative proportion of later stages of lithic reduction should tend to increase as a function of distance from toolstone sources (Bloomer and Ingbar 1992).

Non-quarrying-related tools and weapons, on the other hand, should exhibit a distribution less dependent on the distribution of toolstone. Instead, their spatial patterning should be related to water and other, non-lithic resource distributions.

The Character and Distribution of Features

All reaches of the Class II study area lie within a reasonable daily travel distance to the heart of the Quarries. We expect, therefore, that diurnal quarrying forays (Elston 1992a) could have been mounted from campsites in the study area. Features reflecting mid to late stage reduction of toolstone packages originating at the Quarries should, then, be observed to the limits of the study area.

Campsites occupied by quarriers should be located near those water sources closest to sources of toolstone. Springs in the study area that are nearest utilized toolstone sources, therefore, should manifest signs of residentiality, even if short-term and ephemeral. And such residential features should cluster near exploited toolstone sources. Reduction features near quarries should be clustered and characterized by early stage reduction debris, while those near residential features should manifest higher proportions of later stage debris (Raven 1992b). Anomalous clusters of early stage reduction features may predict the general location of otherwise undiscovered toolstone sources (Elston et al. 1992).

Later stages of reduction entail removal of less waste mass, so limited transport can occur prior to final reduction without incurring excessive transport costs. Further, if later stages in the reduction trajectory are to be improved by heat-treatment (a time-intensive process), it may be advantageous to transport partially reduced material to a camp setting, where its processing can be tended in off-hours or by a non-quarrying labor force. In this case, late stage and post heat-treatment reduction stations should lie some distance from the source and should cluster around a residential zone (Elston et al. 1992).

Chapter 4. SAMPLE DESIGN AND FIELD METHODS

The Class II sampling universe, encompassing 28,480 acres, is coterminous with the limits of the Tosawihi Quarries National Register District proposed by Rusco (1983), although it excludes areas of prior surveys (see Figure 2). To affect survey of at least 10% of the study area, as directed by the Bureau of Land Management, a random stratified sample of 151 19.4 acre (7.84 ha; 280 m x 280 m) survey quadrats was drawn.

The mapped study area initially was divided into 1446 potential survey quadrats (Appendix A). The southwest corner of each quadrat was assigned a row and column coordinate designation beginning with the row/column origin (0,0) of the southwest corner of the study area (Figure 8). For example, the quadrat designated "North 24, East 17" would be that quadrat lying 24 units north and 17 units east of the southwest corner of the study universe.

Each potential survey quadrat then was stratified (Table 1) according to across-unit average slopes under or over 6%, to the presence or absence of potential toolstone sources (silicification zones mapped by Cornucopia, 1987; see Figure 4), and to the presence or absence of nearby water (in the current or any adjacent quadrat; within approximately 560 m). Ten percent of the units in each stratum (defined by all possible co-occurrences of the above categories) were selected randomly (Table 1; Appendix B). The 151 selected units (Figure 9) were plotted on 7.5' USGS maps for use in the field.

Table 1. Summary of Class II Sample Selection.

		Slope <6%		Slope >6%		Total
Number of Potential Units in Each Stratum (overall %)						
Has Water	Has Toolstone	4	(.3)	4	(.3)	8
	Has No Toolstone	26	(1.8)	44	(3.0)	70
Has No Water	Has Toolstone	72	(5.0)	48	(3.3)	120
	Has No Toolstone	577	(39.9)	671	(46.4)	1,248
Total		679		767		1,446
Number of Units Selected for Survey in Each Stratum (No. of Acres Surveyed)						
Has Water	Has Toolstone	4[a]	(77.6)	4[a]	(77.6)	8
	Has No Toolstone	3	(58.2)	4	(77.6)	7
Has No Water	Has Toolstone	7	(135.8)	5	(97.0)	12
	Has No Toolstone	57	(1105.8)	67	(1299.8)	124
Total		71		80		151

[a]100% of these strata selected due to rarity.

Employing topographic maps plotted with quadrat unit boundaries, compasses, and natural and cultural landmarks, the survey quadrat was located on the ground. A three-member team commenced walking nine parallel transects, spaced 30 m apart (each team made three passes, 280 m in length). Each crew member was responsible for maintaining a parallel course, and for completing artifact tally sheets, feature location maps, and biface and projectile point recording forms. Encountered projectile points were measured and traced in outline. Bifaces were measured, assigned to a pre-defined technological stage, and characterized as to heat-treatment. Quadrat-level data were recorded concerning overall debitage density (using scales consistent with earlier Tosawihi surveys) and character, raw material availability, observed game sign, observed plant communities, water availability, slope, and modern disturbance.

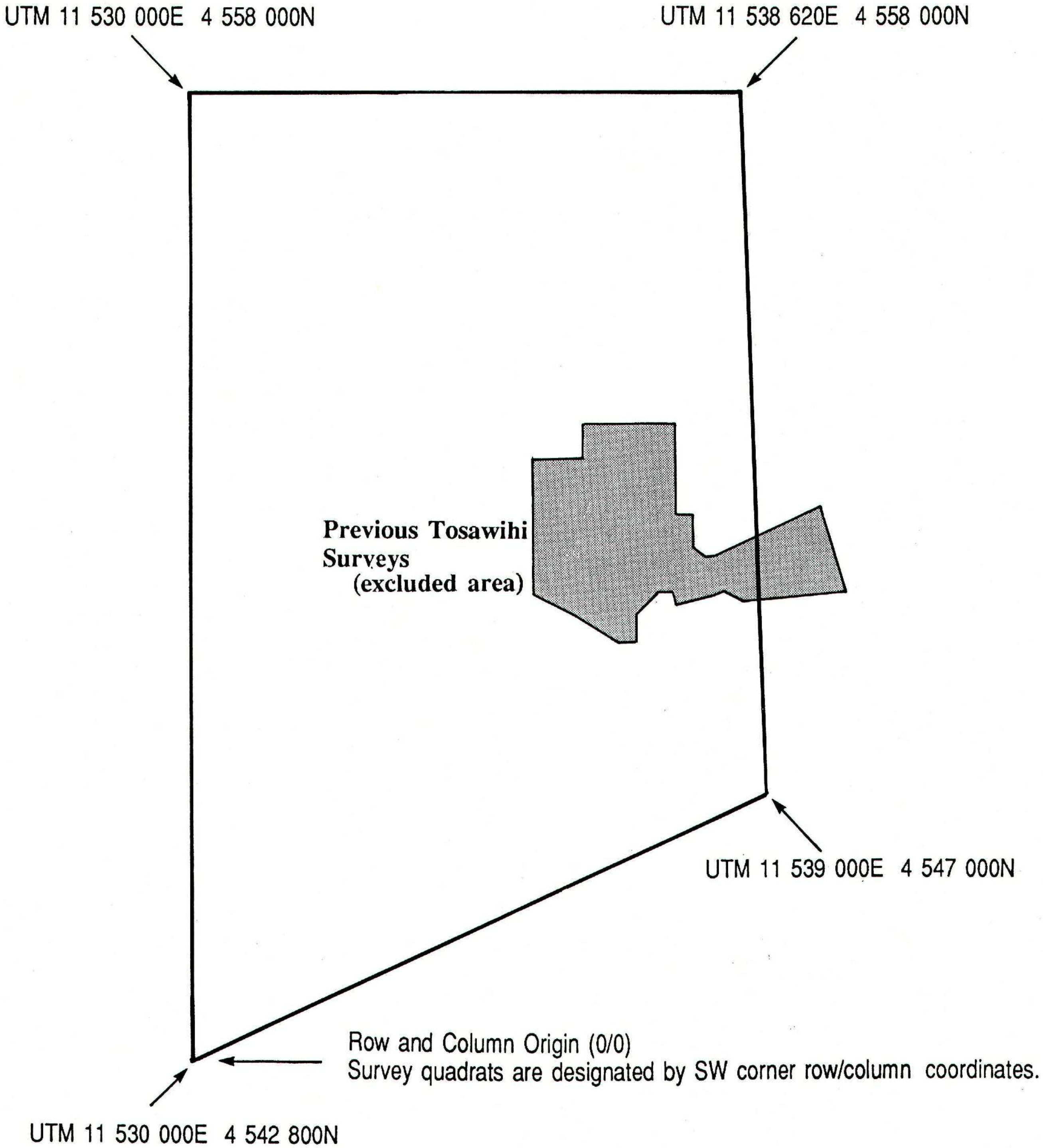

Figure 8. The Class II sampling universe.

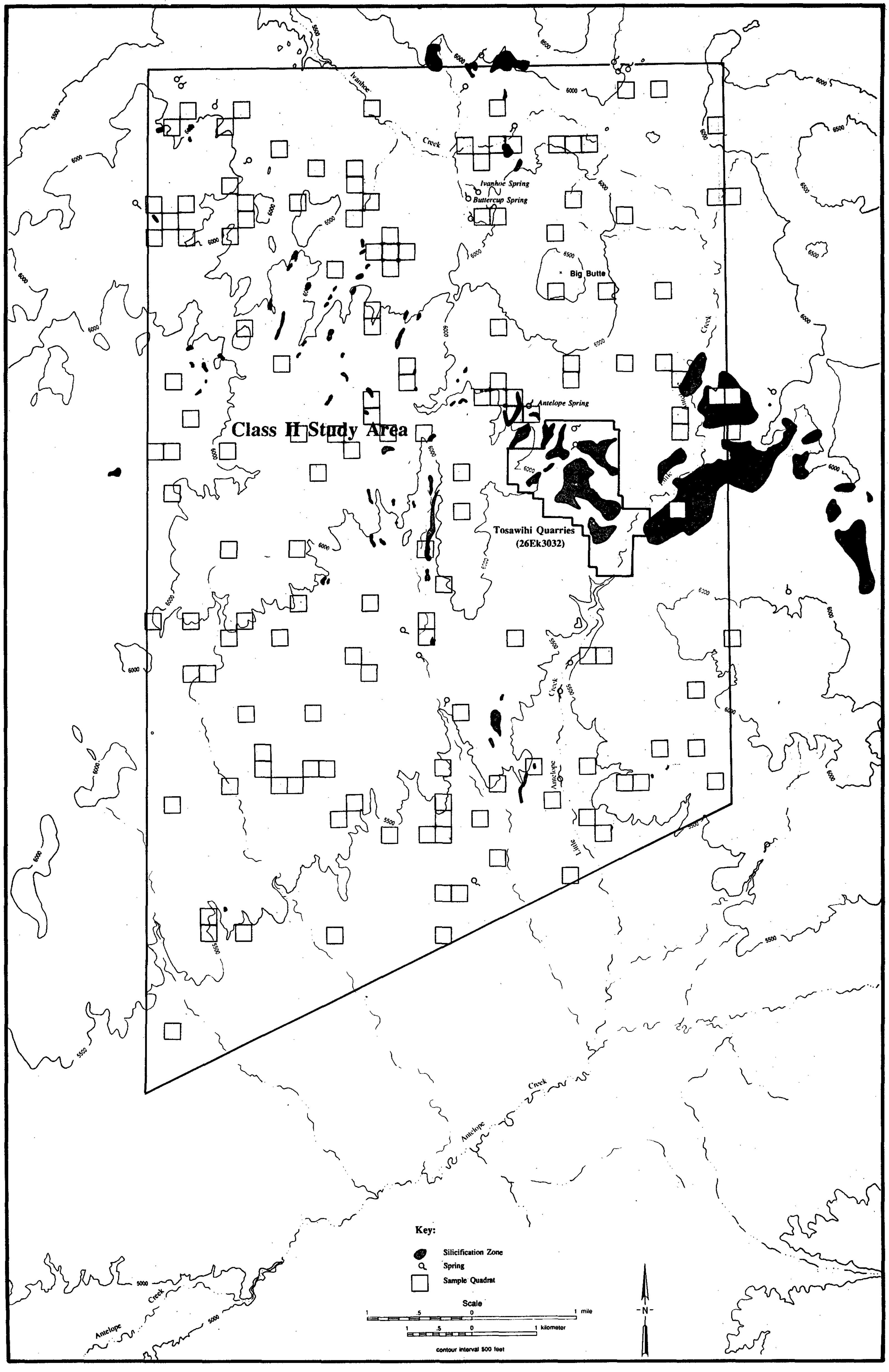

Figure 9. Locations of survey quadrats in the Class II study area.

The actual unit of observation reported herein, then, is the survey quadrat as represented by the suite of nine transects examined in it. Data derived from the survey consist of recorded artifact and feature densities and character (both prehistoric and historic), and overall lithic reduction intensity across sampling strata. It is important to note that we did not record sites or site boundaries, that feature data consist of type, dimensions, and a qualitative assessment of assemblage diversity, and that only artifacts observed within a four meter swath (two meters either side of the transect center line) were tallied. Strict adherence to this swath of observation for purposes of artifact tally allows rigorous comparability of artifact densities among quadrats.

No artifacts were collected save those tools in imminent danger of disturbance or destruction (e.g., by vehicular traffic, vandalism, and the like). The recovered assemblage consists of three projectile points, one crescent, one eccentric chipped stone artifact, and one chert biface fragment, all of which will be included in a collection of Tosawihi materials soon to be transferred to the Nevada State Museum. Additionally, 88 non-artifactual rock samples were collected from surveyed silicification zones.

Silicification Zone Reconnaissance

Because the significance of Tosawihi Quarries lies chiefly in the massive-scale toolstone exploitation exhibited at their core (26Ek3032), it is important to know if there are other, similarly intensive quarrying zones within the Class II study area. We visited a judgmental sample of known silicification zones within, and just beyond, the limits of our study area in order to characterize evidence of prehistoric quarrying activity outside the core Quarries area.

Ninety known silicification zones were plotted (see Figure 4) from a geologic map of the Ivanhoe Mining District (Cornucopia 1987). Seventy-seven of these zones lie within non-excluded portions of the Class II study area, and formed a discrete stratum in the stratified random selection of survey units. Thirteen zones fall beyond the Class II sample universe borders or within previously surveyed regions. Of the 90 mapped zones, 24 encompass more than 2.5 acres and 66 zones are somewhat smaller.

Once we had plotted all known zones, we recognized the wisdom of selecting a sample of zones to field-check, thereby reducing potentially prohibitive travel time between small, widely-spaced opalite outcrops. Rather than conducting a 100% sample of all discrete zones (as we originally had thought to do), we restricted our silicification zone evaluation to (1) those zones that fell within our stratified, randomly-selected survey units, (2) those zones that had been surveyed in the course of prior Tosawihi projects (cf. Elston, Raven, and Budy 1987), and (3) those large zones lying immediately east of the most intensively-used zones in the Quarries and the Eastern Periphery (cf. Botkin, Dugas, and Elston 1992; Botkin 1991). As logistics and time allowed, we bolstered our sample with a purely judgmental selection of additional zones that were convenient to survey units. Three formerly unknown sources of silicification were discovered in the course of the Class II survey, and are included in the qualitative analysis which follows. In all, 61 (68%) silicification zones were examined.

Chapter 5. CLASS II SURVEY RESULTS

Prehistoric Use of the Region

Use of the Lithic Terrane

The opalite components of the Tosawihi Quarries (26Ek3032) lithic terrane saw wide-spread, intensive aboriginal exploitation (Rusco 1983; Elston, Raven, and Budy 1987; Elston and Raven 1992). From its broader geographic perspective, the Class II survey sought to characterize use of the lithic terrane in the archaeologically unexplored uplands surrounding Tosawihi, and to compare this aspect of land use with that observed within the Quarries proper. To this end, 61 mapped silicification zones in and around the study area were inspected and evaluated for evidence of prehistoric use, toolstone quality, and the nature and intensity of quarrying efforts.

Only 16 (26%) of the locations examined exhibited evidence of aboriginal use (Figure 10, Table 2). For the most part, the 45 zones not utilized appear to have been ignored by quarriers due to the low quality of their opalite. Indeed, many zones geologically mapped as "silicified" (Cornucopia 1987) proved upon field checking to consist of soft tuffs not sufficiently silicified to produce knappable raw material.

Table 2. Character of Silicification Zones Examined During the Class II Survey.

		Quality of Material					Type of Use		
Utilization	Survey	Unknown	Poor	Fair	Good	Total	Outcrop	Quarry Pits	Outcrop & Pits
Used									
	Class II	-	-	5 (31.3)	11 (68.7)	16	8 (50.0)	1 (6.2)	7 (43.8)
	Other Tosawihi				6 (100.0)	6			6 (100.0)
Not Used		7 (15.5)	36 (80)	1 (2.2)	1 (2.2)	45	-	-	-

Parenthetic numbers are percentages.

Elsewhere mapped silicification zones within the sample exhibited the full range of toolstone quality recorded for sources within the Tosawihi Quarries (cf. Elston. 1992b). All 16 of the utilized sources encountered in the present study area were of fair (n=5, 31%) to good (n=11, 69%) toolstone quality. We should note, however, the potential circularity in such an assessment because we, like prehistoric quarriers, were limited in our ability to judge accurately the quality of sources on the basis of their visual inspection. As a result of weathering, virtually any naturally exposed opalite surface consists of low quality stone. The quality of pristine material was visible to us only where weathered surfaces had been breached in the course of prehistoric quarrying or as a result of historic mining disturbance. In the case of the latter, several blade cuts in soft, low quality opalite revealed high quality opalite. We suspect that our superficial inspection scored lower the quality of toolstone at many outcrops than would be the case under closer, more invasive observation techniques. Nevertheless, only two sources evaluated as fair to good quality stone did not show prehistoric use. No zones judged to be of low quality appear to have been used prehistorically.

Only sources of good toolstone-quality opalite display high intensity use, and it is only in these zones where quarry pitting, the most costly of extraction methods, occurs. Apparently, sources of lower quality stone did not inspire the investments of time and labor demanded by pit excavation. Instead, these zones served as outcrop quarries exclusively; at many such places characterized by low intensity use, exploitation seems to amount to little more than assay of the outcrops or perhaps acquisition of a small quantity of stone needed to perform some expedient task.

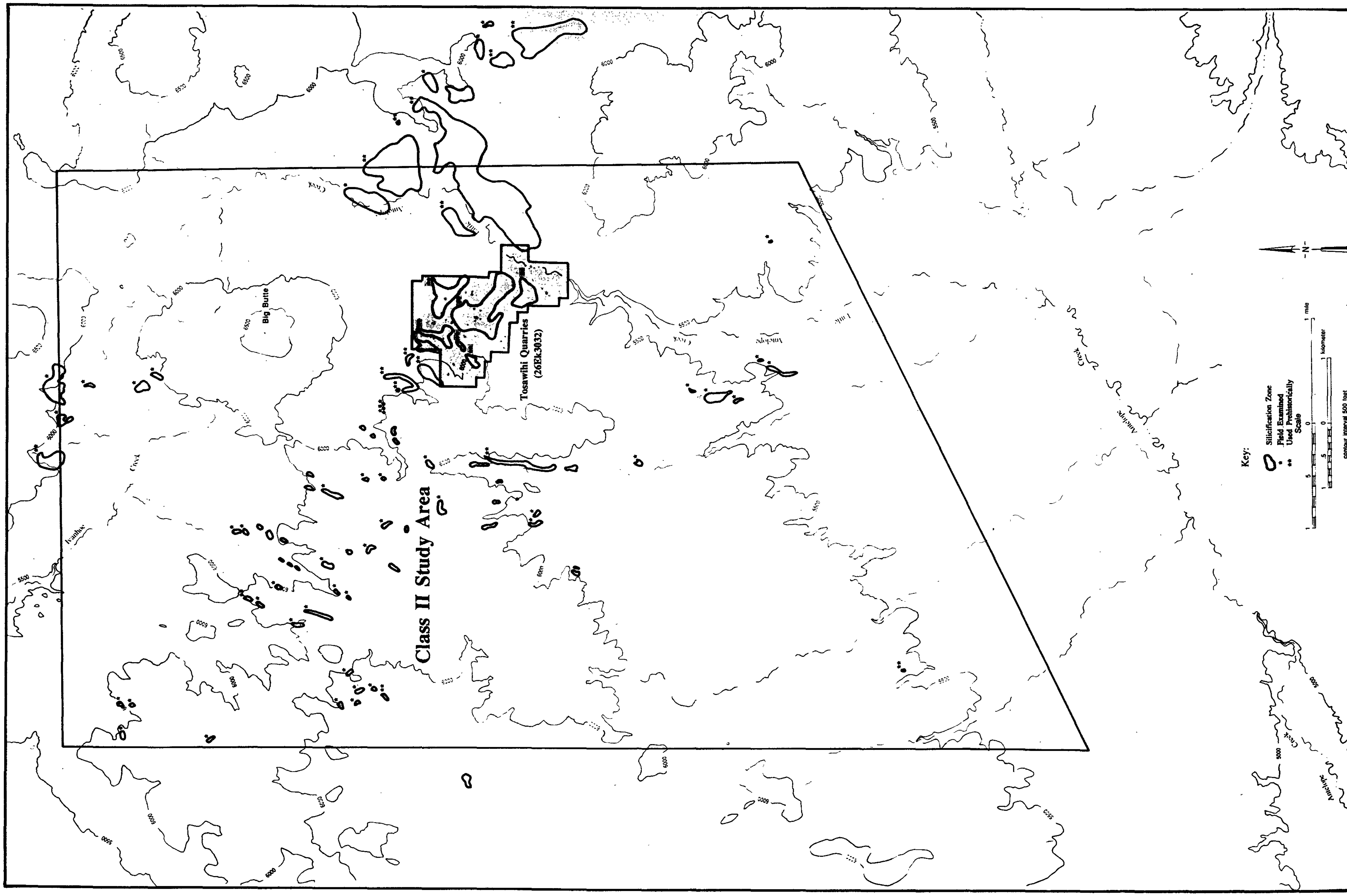

Figure 10. Utilized silicification zones in the Class II study area.

For reasons that we do not understand fully, the largest of the sources appear to have been subjected to the most intensive use. Of the 10 utilized zones covering more than 2.5 acres, 75% (n=7) display moderate to heavy use, while the majority (67%) of the zones smaller than 2.5 acres are characterized by low use intensity. One possible explanation for this may lie in the physical make-up of the rock itself brought about by vagaries of the silicification process. The composition of bedrock referred to by the gloss "opalite" is in fact exceedingly heterogeneous; the product of complex juxtapositions of usable and unusable strata of tuffs, opal, jasper, and sinter (cf. Elston 1992b). At sources examined in the Tosawihi Quarries we observe that toolstone quality in any given zone varies greatly over even limited horizontal and vertical distances. The smaller zones in the Class II study area constitute narrow windows on the bedrock that are of very limited extent over any dimension. Often these take the form of little more than isolated outcrops on ridge tops in the western half of the area, that offer only minimal opportunity for the encounter of the variable potential qualities of the stone. At such places, good quality rock may already have been removed by erosion or may be inaccessible, buried beneath deep colluvial debris. On the other hand, most of the largest zones lie in the eastern half of the study area where down cutting accomplished by major water courses has stripped away softer overburden and rendered many zones into dominant landforms that are not only aerially extensive but also sufficiently incised to expose a wide range of potentially useful strata. Certainly, the larger landforms afford access to a broader selection of assayable material types within the bedrock and present quarriers with a higher probability of success in their search for serviceable stone. Additionally, we infer that the intensity of use focused on the more extensive zones is an artifact of synergistic quarrying behaviors reflective of the economics of toolstone procurement. Results of experimental quarrying disclose that costs of opalite extraction may be reduced markedly by exploiting established sources (Elston 1992a). Archaeological data from the Tosawihi Quarries are unambiguous in the portrayal of the sequent reuse of sources, often for periods spanning hundreds of years (Elston and Dugas 1992).

In terms of the spatial distribution of utilized sources, the highest incidence and intensity of toolstone extraction encountered during Class II survey coincides with zones in the immediate vicinity of the Tosawihi Quarries. Although potentially usable stone outcrops in places throughout the full geographic and topographic extent of the study area, only four (25%) of the utilized sources occur farther than 2.5 km from 26Ek3032. These zones lie in what seems to be a comparatively little used hinterland near the northern, western, and southern limits of the study area at distances of 6 km to 9 km from the heart of the Tosawihi Quarries (see Figure 10). Each of these sources, containing only fair toolstone, evidences minimal use as outcrop quarries.

By contrast, three-quarters of the zones that saw use lie immediately adjacent the zones that constitute the Tosawihi Quarries site. In terms of the quality of their toolstone and the pronounced intensity of their aboriginal exploitation, these sources are indistinguishable from the remains that characterize the archaeological record of the Tosawihi Quarries themselves. Like the sources within 26Ek3032, these zones all are of high toolstone quality. Each covers an area well in excess of 2.5 acres and quarry pit excavation constitutes the dominant extraction technique.

Although inspection of silicification zones focused solely on primary opalite sources, quadrat survey during the Class II exercise and earlier observations reveal that secondary deposits in the form of opalite stream cobbles contribute to the lithic terrane at Tosawihi as well. Cobble sources are found in greatest abundance in the drainage bottoms downstream of 26Ek3032. They occur principally in the beds of Little Antelope Creek and its tributaries and, with diminishing density and size, are available as far away as the confluence of Antelope Creek and Rock Creek some 20 km west of the Quarries (R.G. Elston, personal communication 1991). Due to their hardness, numerous internal fracture plains, and other flaws that impede their workability, cobbles appear to have been low ranked raw materials. This especially is the case in places where alternative supplies could be obtained from better quality primary sources. In the immediate vicinity of Tosawihi we see only sporadic use of stream cobbles as toolstone. However, as distance from the Quarries increases we observe an increase in the incidence of cobble use until at some geographic extremes of the study area and beyond, we find that the secondary sources constitute the only locally available opalite supplies.

The Character, Density, and Distribution of Formed Artifacts and Debitage

Bifaces

Lithic production at Tosawihi Quarries consisted resoundingly of the production of bifaces. We have, now, an excellent understanding of the organization of local biface production achieved through intensive technological examination of a large sample (well over 4000) of bifaces produced at the Quarries (Ataman and Botkin 1991; Bloomer, Ataman, and Ingbar 1992). Research issues driving biface analyses in these earlier Tosawihi investigations concerned lithic procurement patterns, function of bifaces produced at Tosawihi, and role of bifaces in mobility and exchange systems. Analysis of production stages, manufacturing techniques, function, breakage rates, geographical distribution, and raw material heat-treatment has produced a comprehensive evaluation of biface technology and lithic export for this region.

Biface production is a reductive process, a continuum of form from flake, cobble, or block to finished core or tool (Bloomer, Ataman, and Ingbar 1992). The reduction continuum can be segmented into useful analytical units; bifaces with characteristic morphological or flake scar attributes can be assigned to reduction stages (Callahan 1979; Crabtree 1972; Young and Bonnichsen 1984). The Tosawihi bifaces were classified into Stages 1 through 5, according to Callahan's (1979) model, ranging from blanks (Stage 1), edge-prepared bifaces (Stage 2), bifaces with primary thinning (Stage 3), bifaces revealing secondary thinning (Stage 4), to relatively finely shaped bifaces (Stage 5) (Bloomer, Ataman, and Ingbar 1992).

Early stage processing took place at the Quarries, and mid-reduction stage items, having been heat-treated at some stage prior to export, then were transported out of the area, probably as mid to late Stage 3 bifaces (Ataman and Bloomer 1992; Ataman and Botkin 1991). Heat-treatment of Tosawihi toolstone was common (the process is evident in the toolstone as a distinct luster on the surfaces of flake scars), a process that yields increased compliance or flaking predictability and control. Ultimately, finished bifaces are more likely to have been used as knives, rather than as bifacial cores.

The formed artifact assemblage observed during Class II survey was dominated by bifaces. Two hundred forty whole and fragmentary bifaces observed on transect were monitored for material type, reduction stage, completeness, and evidence of heat-treatment (Table 3), using criteria defined in earlier Tosawihi research (Ataman and Bloomer 1992; Bloomer, Ataman, and Ingbar 1992). Opalite was the preferred material type in 99% of bifaces observed on transect, and over 92% of bifaces were fragmentary. Though we conducted no technological analysis of breakage patterns, most fragmentary bifaces from the main Quarries area (comprising over 90% of the entire assemblage) were broken during manufacture (Bloomer, Ataman, and Ingbar 1992) and we assume this to be the case with the Class II bifaces. The few complete bifaces observed (n=18) ranged from early Stage 2 to late Stage 3 forms.

Table 3. Bifaces Observed on Transect During Class II Survey.

Reduction Stage	Frequency (%)		Frequency (%) of Stage Heat-Treated	
Stage 1	2	(0.8)	0	(0.00)
Early Stage 2	25	(10.4)	1	(4.00)
Late Stage 2	26	(10.8)	4	(15.38)
Early Stage 3	41	(17.1)	11	(26.83)
Mid Stage 3	30	(12.5)	13	(43.33)
Late Stage 3	42	(17.5)	19	(45.24)
Early Stage 4	46	(19.2)	32	(69.57)
Late Stage 4	18	(7.5)	15	(83.33)
Stage 5	10	(4.2)	9	(90.00)
Total	240	(100.00)	104	

The biface assemblage is characterized by the entire range of reduction stages, with late Stage 3 (17.5%) and early Stage 4 (19.2%) bifaces being most common. As depicted in Figure 11, bifaces discarded in the early stages of production (Stage 1 through early Stage 3) are distributed broadly over the Class II region (in 22% of the survey quadrats). Middle stage (middle Stage 3) bifaces are slightly more restricted in their distribution (14% of survey quadrats), while late Stage (late Stage 3 through Stage 5) bifaces were observed in more quadrats (28%) than any other forms.

Considering all stages of bifaces in the aggregate, the largest proportion (33.3%) of the total lies within 1 km of the principle Quarries with minor peaks (20.4% and 15.4%) at 3 km and 4 km, respectively. We compared the distribution of all bifaces across 1000 m radii against the distance distribution of quadrats to evaluate whether quadrat placement might have skewed biface frequency distribution in some regular way. A Kolmogorov-Smirnov two-sample test revealed a significant difference in the proportional contribution of each data set (Dmax=.21, Dcrit=.14, at p=0.05, n1=240, n2=151). The location of quadrats relative to the Quarries is not determining the location of bifaces. The high proportion of bifaces close to the Quarries reflects not sampling bias but rather a behavioral phenomenon relating to production and discard of large numbers of bifaces near toolstone sources.

The distribution of early, middle, and late stage bifaces was examined relative to their linear distance from the main Quarries (Figure 12). Middle stage bifaces are not significantly different from early or late stage forms in their proportional distribution across distance radii. Still, more middle stage bifaces (33%) were discarded within 1 km of the Quarries than in any other distance class. Early and late stage bifaces do differ significantly in their distribution, however (Kolmogorov-Smirnov two-sample test: Dmax=.4, Dcrit=.19, at p=0.05, n1=94, n2=116). Early forms reach their highest densities adjacent the main Quarries in quadrats that contain large, high quality silicification zones (see Figure 11). Fifty-three percent of these bifaces were discarded within 1 km of the Quarries. In stark contrast, only 17% of late stage bifaces were abandoned in this nearby zone.

The characteristic distribution of bifaces across stages differs considerably from that profile observed in other Tosawihi study areas (Figure 13). The aggregate biface assemblage from all prior Tosawihi investigations is dominated by Stage 3 bifaces (Bloomer, Ataman, and Ingbar 1992), while the Class II assemblage is distributed more evenly over stages, with substantially higher proportions of late stage bifaces.

As mentioned, bifaces probably were exported from the main Quarries as early Stage 3 to late Stage 4 forms, with most departing as middle and late Stage 3 bifaces (Ataman and Bloomer 1992). That the Class II assemblage contains higher proportions of discarded later stage forms than the main Quarries suggests that the more distant environs of the Class II region were further along a production and transport network that originated at the Quarries. Yet, the presence of broadly distributed early stage bifaces, indeed to the limits of the Class II study area, indicates that primary lithic production was continuing beyond the main Quarries, as well.

Stageable biface forms are distributed differentially among the five principal Tosawihi study areas. Figure 14 depicts the proportions of bifaces, by stage, comprising the biface assemblages of all study areas in the aggregate. Each biface stage is shown as a discrete box, with study areas listed along the y-axis; the boxes are clustered into early, middle, and late stage groupings. To illustrate, a dot plotted along the percentage scale at a given study area in the "Stage 1" box signifies the proportion contributed by that study area to the assemblage of Stage 1 bifaces found in all study areas (the percentages demarcated in each box sum to 100%).

Biface stage and location of discard are powerfully associated (chi-square=523.21, df=32, p<0.001): early reduction stages tend to be associated with the Quarries and the Eastern Periphery, while later forms tend to dominate in the Western Periphery, Northern Corridor and the Class II study area. This pattern is illuminated by a dot plot of adjusted standardized residuals (Figure 15; Everitt 1977) that highlights significant (p=0.05)

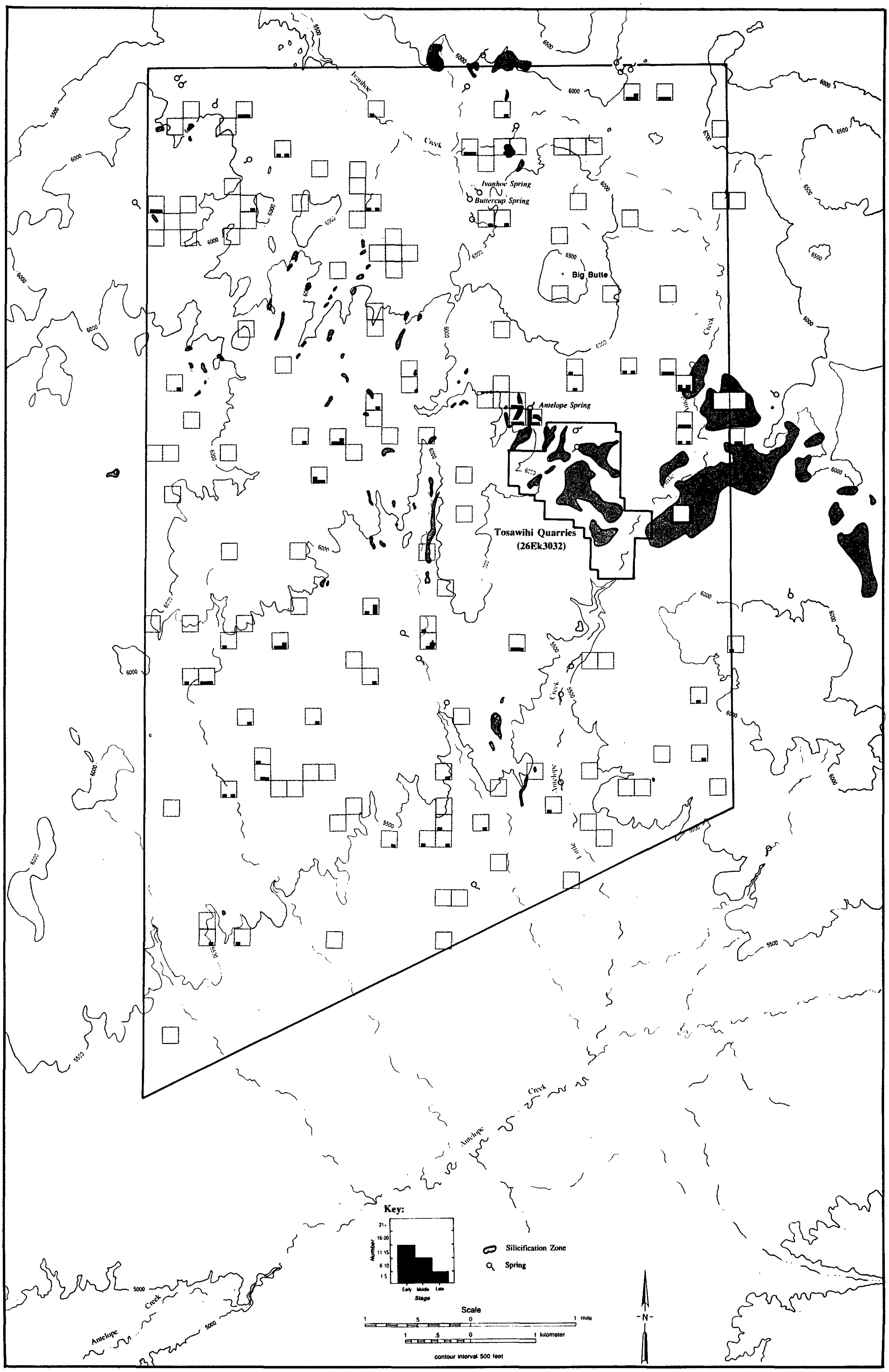

Figure 11. Bifaces, by reduction stage, observed in the Class II survey.

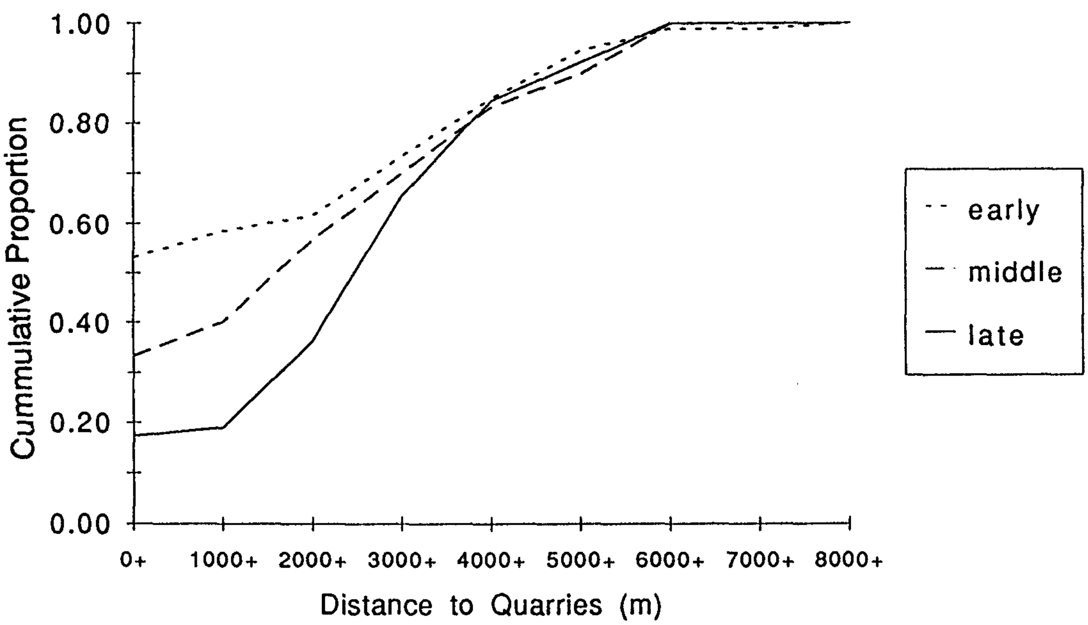

Figure 12. Cumulative proportions of bifaces by radial distance to the principal Quarries.

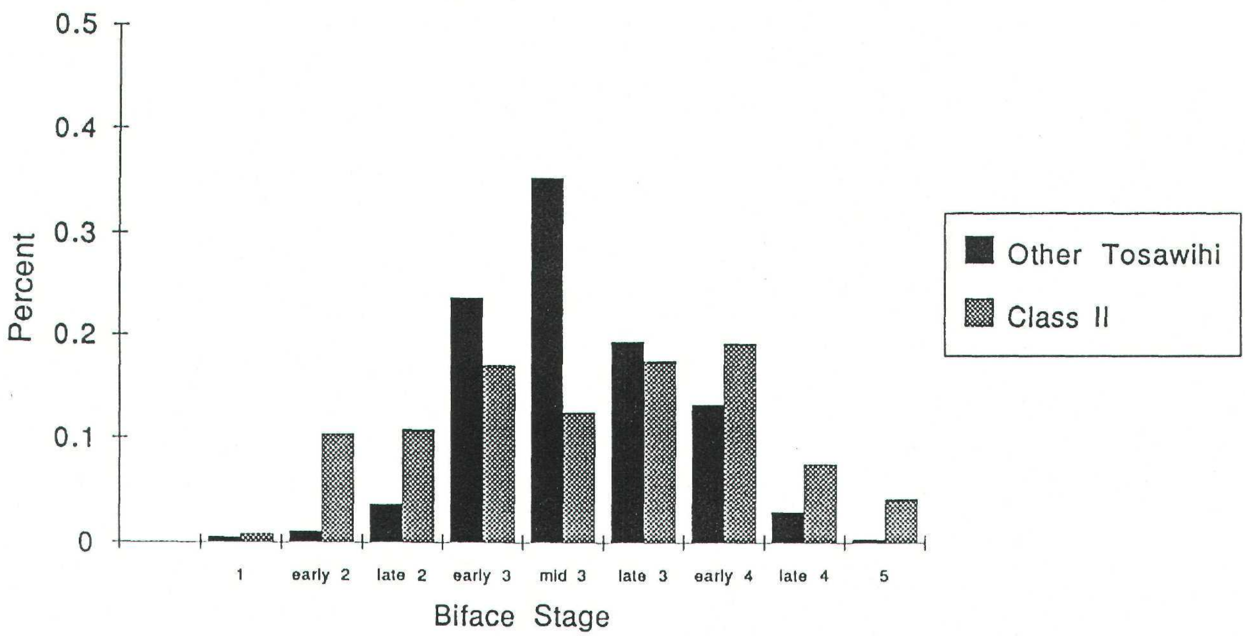

Figure 13. A comparison of biface reduction stages observed during the Class II survey and other Tosawihi surveys.

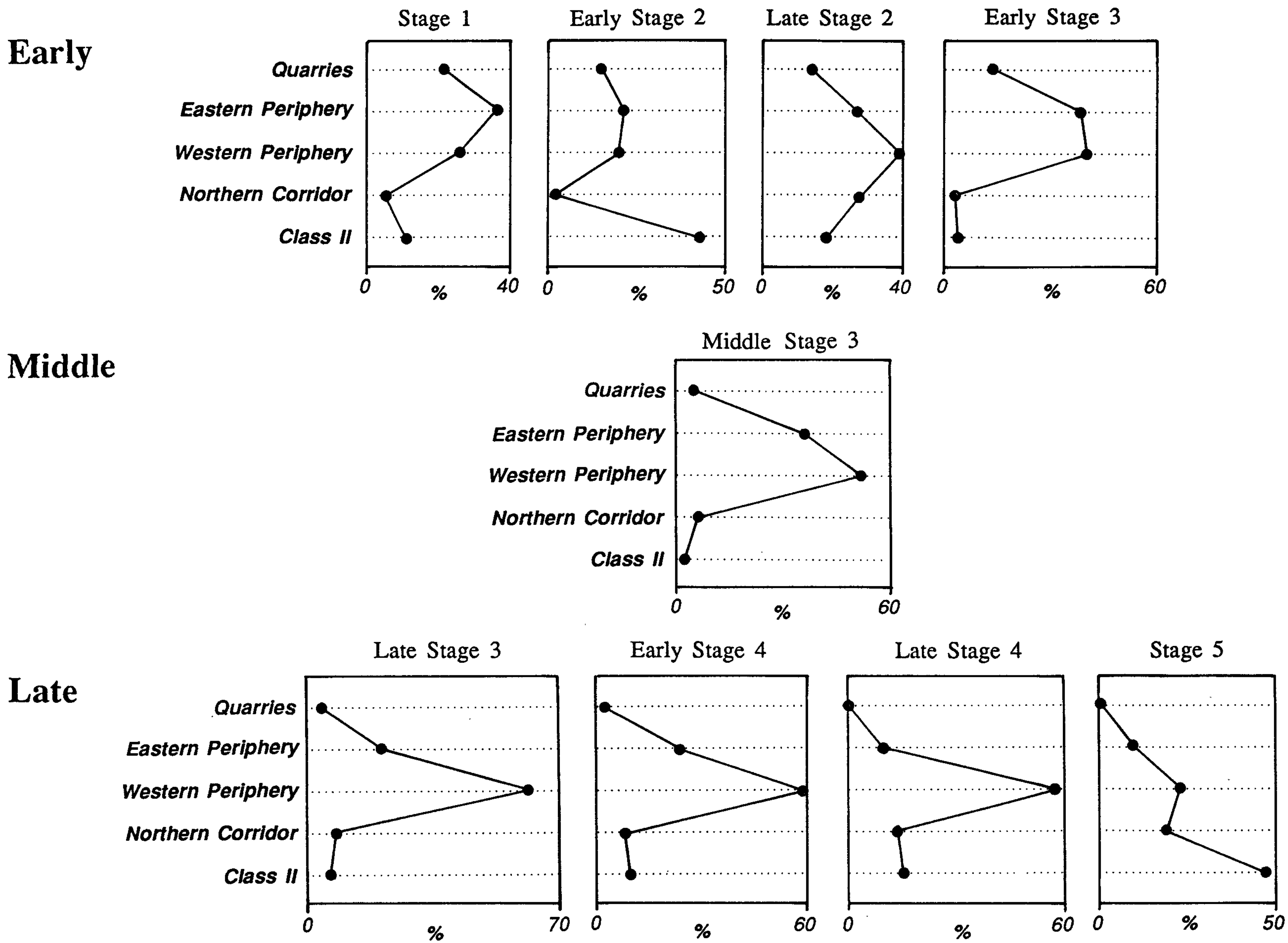

Figure 14. Proportions of staged bifaces observed across all Tosawihi study areas.

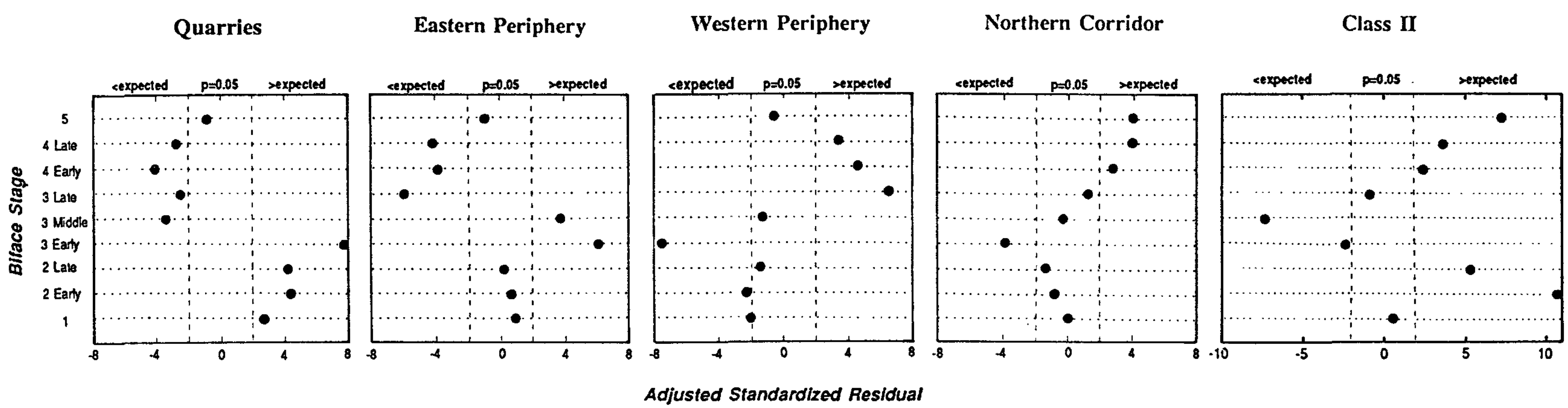

Figure 15. Adjusted standardized residuals for staged bifaces observed across all Tosawihi study areas.

deviations from chi-square expected values (adjusted standardized residual values that are higher/lower than expected under a model of independence are shown by a dot in the appropriate column).

In the main Quarries, there are significantly more Stage 1, Stage 2 and early Stage 3 bifaces than later forms. In the Eastern Periphery, outside the Quarries proper but containing a number of toolstone sources, early and middle Stage 3 bifaces are more common than expected. In the Western Periphery, an area that is somewhat removed from usable toolstone sources and which contains several residential camps, late Stage 3 and Stage 4 bifaces are more commonly found. The Northern Corridor, even farther from the main Quarries, yielded higher than expected frequencies of Stage 4 and 5 bifaces. This dominance of late forms is echoed in the Class II study area, where Stage 5 bifaces are particularly strongly manifest (48% of all Stage 5 forms were found in the Class II region).

The higher than expected frequency of Stage 2 bifaces in the Class II assemblage is also an interesting pattern. We see (in Figure 11), however, that the highest densities of early stage bifaces (Stage 1- early Stage 3 items) are found in only two quadrats adjacent 26Ek3032, which contain their own large, high-quality silicification zones. The presence of these large toolstone sources in a portion of the Class II study area adjacent the principal Quarries renders that portion effectively equivalent to the Quarries.

The stage at which Class II bifaces were discarded and the frequency with which they were heat-treated (see Table 3) reveals a regular pattern (chi-square=63.65, $p<0.001$), suggesting significant value in the increased control yielded by heat-treatment as bifaces advanced in stage (and declined in size). Earlier stages of bifaces (Stages 1-early Stage 3) were heat-treated less often than expected (under conditions of statistical independence), while later stages (particularly early Stage 4 - Stage 5) were heat-treated more frequently than expected (analysis of adjusted standardized residuals [Everitt 1977]). The proportion of heat-treated bifaces, within stage, increases notably from early to middle Stage 3, and then again from late Stage 3 to early Stage 4. Between 70% and 90% of all Stage 4 and 5 bifaces were heat-treated, suggesting that heat-treatment was a significant technological element of the final stages of manufacture.

In prior Tosawihi studies (Bloomer, Ataman, and Ingbar 1992), it was observed that those items farthest from toolstone sources were most likely to be heat-treated. In the Class II region, heat-treatment and distance from the main Quarries are indeed associated positively (chi-square=40.81, df=7, $p<0.001$; Table 4).

Table 4. Cross-Tabulation of Heat-Treated and Non-Heat-Treated Bifaces Against Distance Radii from Tosawihi Quarries (26Ek3032).

	Bifaces	
Distance from Quarries (km)	Heat-Treated (%)	Non-Heat-Treated (%)
0 - 0.9	16[a]	84[b]
1.0 - 1.9	67	33
2.0 - 2.9	71[c]	29[d]
3.0 - 3.9	55	45
4.0 - 4.9	54	46
5.0 - 5.9	50	50
6.0 - 6.9	50	50
7.0 - 7.9	-	-
8.0 - beyond	-	100

[a]Significant ($p<.05$) Adjusted Standardized Chi-Square Residual = -5.987
[b]Significant ($p<.05$) Adjusted Standardized Chi-Square Residual = 5.987
[c]Significant ($p<.05$) Adjusted Standardized Chi-Square Residual = 3.192
[d]Significant ($p<.05$) Adjusted Standardized Chi-Square Residual = -3.192

Bifaces within 1 km of the main Quarries are highly unlikely to be heat-treated, reflecting their primary production at the Quarries, confirming previous observations that heat-treatment tends to take place away from sources of lithic extraction, and echoing the Tosawihi pattern of relatively early stage reduction near these important toolstone sources. Beyond this distance, however, the proportion of heat-treated bifaces jumps dramatically and remains relatively high for a radius of several kilometers. Interestingly, once a 5 km radius has been reached, bifaces are equally likely to be heat-treated or not heat-treated. This pattern may indicate primary production taking place at some distance from the Quarries, perhaps originating at an unknown toolstone source.

Projectile Points

The full chronological range of Great Basin time-markers witnessed in the principal Quarries (Elston and Drews 1992) was observed in the Class II survey area (Table 5), save for the earliest Clovis form. Though projectile points generally were not collected, all points encountered during survey were traced. Points were assigned to temporal styles by comparison of metrics to Thomas's (1981) Monitor Valley key (Appendix C).

Table 5. Projectile Points Observed During Class II Survey.

	Material (%)			Observed		
Point Type	Opalite (or other)	Obsidian	Basalt	On Transect	Off Transect	Total
Desert Series	1 (.02)	-	-	1	-	1
Rosegate	4 (.08)	2 (.04)	-	4	2	6
Elko Series	9 (.18)	-	-	7	2	9
Gatecliff	4 (.08)	-	-	2	2	4
Humboldt	3 (.06)	-	-	2	1	3
Large Side Notched	2 (.04)	-	-	1	1	2
Great Basin Stemmed	1 (.02)	-	1 (.02)	-	2	2
Not Typable	18 (.36)	4 (.08)	1 (.02)	18	5	23
Total	42 (.84)	6 (.12)	2 (.04)	35	15	50

The presence of Great Basin Stemmed, Gatecliff series, Humboldt series, Elko series, Rosegate series, and Desert series point styles documents use of the Class II region from the Pre-Archaic through the Archaic. And their frequent manufacture from opalite, rather than from other materials, signals directed use of the region for procurement of raw material, as well. The general landscape distribution of projectile points compared to other artifact forms is discussed below.

Additional formed artifacts were recorded during Class II survey (Appendix D). Tool types have been defined in earlier Tosawihi reports (especially, Elston and Raven 1992).

Debitage

Just beyond the principal opalite sources of the Tosawihi Quarries, debitage densities decline significantly. While the Quarries present a near continuous distribution of debitage, ranging from sparse to a virtually unbroken pavement of opalite reduction debris (see Elston, Raven, and Budy 1987: Figure 9), debitage was absent to sparse in 90% of all Class II survey quadrats. Nineteen percent (n=28) of the survey quadrats were entirely devoid of debitage. Seventy-one percent (n=107) of all quadrats were characterized by generally sparse (average density of less than 1 flake per square meter) levels. Only 9% (n=14) contained light (1-100 flakes per square meter) densities of debitage, and just 1% (n=2) contained moderate (more than 100 flakes per square meter) levels. Those quadrats containing light to moderate debitage densities consistently are located either adjacent the large silicification zones extending from the principal Quarries or near significant water sources (Figure 16).

The relative overall density of debitage across quadrats appears unrelated to the distribution of silicification zones well outside the main Quarries. Quadrat debitage density, ranging from absent to sparse to light, was compared at 500 m distance radii (ranging from 0 - 2500 m) from silicification zones. No correlation between debitage density and distance of quadrat from silicification was revealed in a chi-square test of the two variables (chi-square=11.34, p<.25, df=10). This finding is hardly surprising, given the generally poor quality and infrequent use of outlying mapped outcrops discussed above.

Debitage reduction patterns mirrored those seen in biface reduction forms: as one leaves the Quarries, debitage size generally becomes smaller and thinner. During Class II survey, we observed mostly medium to small debitage, suggesting the transport of relatively good (already thin and requiring little additional reduction) flake blanks or medium to late stage bifaces away from the Quarries. If toolstone sources external to the Quarries had been importantly used, we would have expected to see reduction scatters consisting of large, chunky (primary reduction) debitage clustered about silicification zones. Instead, the debitage assemblages in only 7.2% of all quadrats were generally characterized as dominated (50% or more) by large debitage. In marked contrast, 60.3% of quadrats contained predominately medium-sized debitage. Just over 10% were characterized primarily by small debitage.

The high proportion of quadrats with small and medium-sized debitage reflects a mid-stage reduction focus over a large portion of the Class II region. The Class II environs, then, are still well within a "zone of production" marked by continued *reduction* of toolstone products extracted from the main Quarries, rather than *use* of finished products.

The Density and Distribution of Artifacts Across Sampling Strata

As expected, bifaces and assayed cobbles outrank in density all other formed artifact types (Table 6). Densities of artifacts across sampling strata are highly variable, though in all cases artifacts occur with greatest frequency on slopes less than 6%. In this more gentle landscape, quarrying or lithic reduction-related implements and by-products (eg. bifaces, cores, assayed cobbles, modified chunks, percussion tools) occur in highest densities in quadrats containing toolstone that are relatively near water. In contrast, points and preforms, flake tools, and exotic materials (primarily obsidian) are most common near water, regardless of toolstone availability. These two distribution profiles—one near toolstone and water, the other near water independent of toolstone availability—reflect two quite different behavioral dimensions. The dimension represented by bifaces, cores, assayed cobbles, modified chunks, and percussion tools refers to a lithic extraction-tool production trajectory while the latter (points and preforms, flake tools, and exotic materials) suggests more diversified maintenance and resource procurement activities. Because the target resources of each activity set can be expected to differ markedly, so can the locations in the landscape in which they occur.

The association between artifact types and individual sampling strata (each possible pair of conditions re slope, stone, and water) is demonstrably significant (chi-square=41.94, 79.66, 78.89, respectively, p<.001 in all cases; groundstone and percussion tools removed from analysis due to rarity). An analysis of adjusted standardized residuals (Everitt 1977) signaled particular classes of data that were responsible for the significant

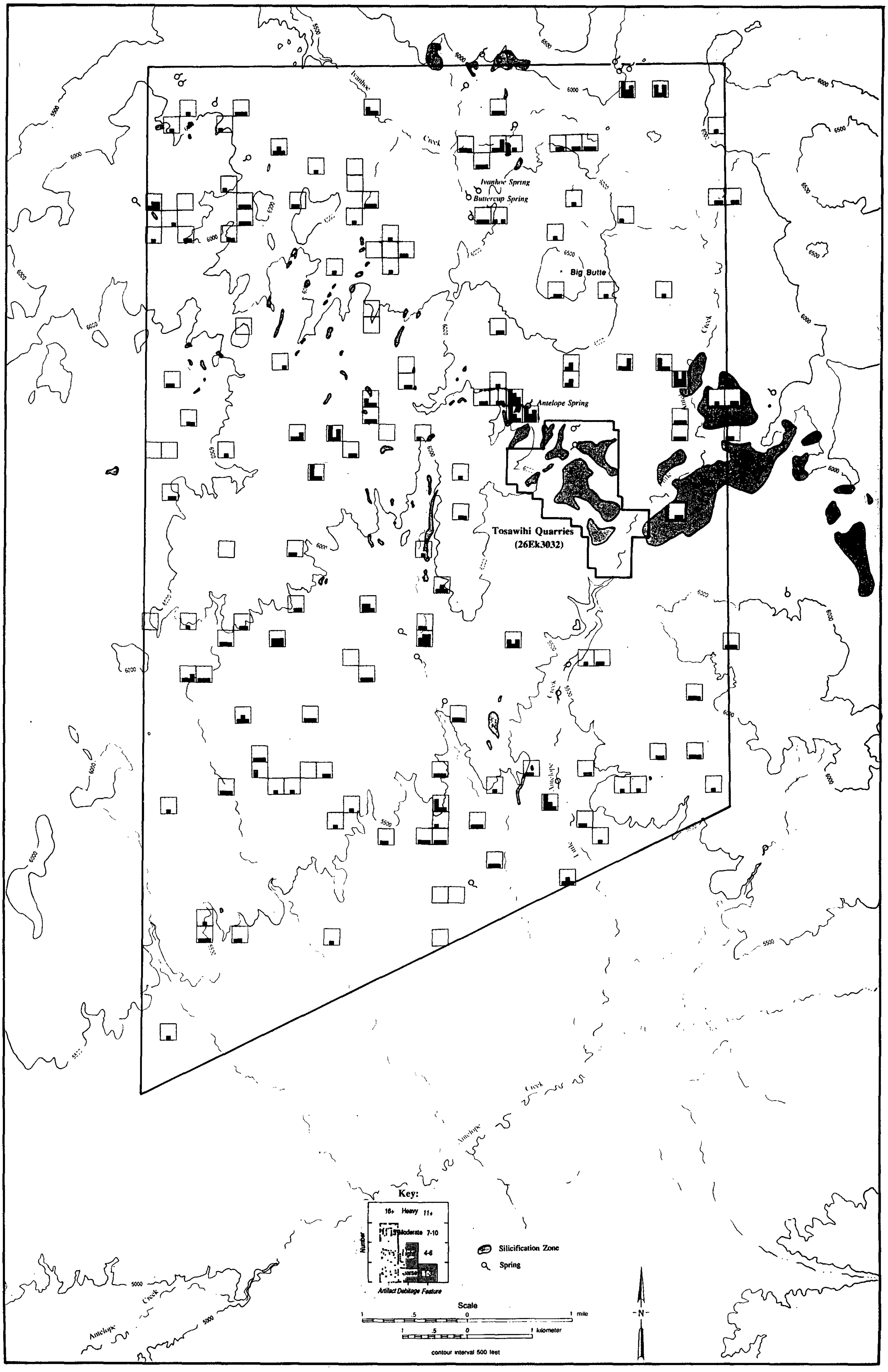

Figure 16. Relative densities of debitage, artifacts, and features across the study area.

chi-square. More flake tools and bifaces than expected occurred on slopes over 6%, and more assayed cobbles and modified chunks occurred near water and toolstone sources and on slopes under 6%. This latter phenomenon no doubt was conditioned by the prevalence of large silicification zones in the gentle valleys and plains immediately north and east of the main Tosawihi Quarries. More bifaces and points/preforms than expected occurred away from water and toolstone, suggesting that there may be a secondary lithic production trajectory that relates to later stage tool fabrication in conjunction with game procurement activities. This pattern accords well with our observation that late stage biface production is relatively common in the Class II study area, in contrast to the Quarries.

Table 6. Distribution and Density of Prehistoric Artifacts Across Sampling Strata.

Sampling Strata			**Artifact Frequency**									
Slope[a]	Stone[b]	Water[c]	Bifaces	Points/ Preforms	Cores	Assayed Cobbles	Modified Chunks	Ground-stone	Percussion Tools	Flake Tools	Exotic Material	Total
0	0	0	96	21	5	33	15	1	2	6	8	187
0	0	1	13	4	-	-	-	-	-	1	5	23
0	1	0	16	4	-	-	-	-	-	2	5	27
0	1	1	41	-	2	76	28	-	4	-	2	153
1	0	0	58	12	2	1	3	3	-	6	5	90
1	0	1	2	-	-	-	-	-	-	-	-	2
1	1	0	4	2	-	4	2	-	-	-	-	12
1	1	1	10	1	-	-	-	-	-	1	1	13
Total			240	44	9	114	48	4	6	16	26	507

Sampling Strata			**Artifact Density** *(Frequency per Acre Surveyed)*[a]									
Slope[b]	Stone[c]	Water[d]	Bifaces	Points/ Preforms	Cores	Assayed Cobbles	Modified Chunks	Ground-stone	Percussion Tools	Flake Tools	Exotic Material	Total Density/ Acre
0	0	0	.087	.019	.005	.030	.014	.001	.002	.005	.007	0.169
0	0	1	.223	.069	-	-	-	-	-	.017	.086	0.395
0	1	0	.118	.029	-	-	-	-	-	.015	.037	0.199
0	1	1	.528	-	.026	.979	.361	-	.052	-	.026	1.972
1	0	0	.045	.009	.002	.001	.002	.002	-	.005	.004	0.069
1	0	1	.026	-	-	-	-	-	-	-	-	0.026
1	1	0	.041	.021	-	.041	.021	-	-	-	-	0.124
1	1	1	.129	.013	-	-	-	-	-	.013	.013	0.168
Artifact Class Density across Sample Universe (n/2929.4 acres surveyed)			.082	.015	.003	.039	.016	.001	.002	.005	.009	.173

[a]See Table 1 for acres surveyed

[b]Slope 0=Quadrat mean slope is <=6%
1 = Quadrat mean slope is >6%

[c]Stone 0=Quadrat contains no toolstone source
1 = Quadrat contains toolstone source

[d]Water 0=Quadrat lies more than 560 m from a water source
1 = Quadrat lies within 560 m of a water source

The Character, Density, and Distribution of Features

The array of feature types distributed across sampling strata is dominated, not unexpectedly, by quarrying features (cairns, cobble quarries, cobble aggregations, outcrop quarries, and quarry pits) and reduction scatters (Table 7; Appendix E). Two culture-bearing rockshelters and several linear rock alignments and rock rings situated near saddles or overlooking water sources (probably serving as hunting blinds) round out the assemblage of features observed during Class II survey.

Table 7. Distribution and Density of Prehistoric Features Across Sampling Strata.

Sampling Strata			**Features (n)**											
Slope[a]	Stone[b]	Water[c]	Cairn	Cobble Aggregation	Cobble Quarry	Isolate	Linear Rock Alignment	Outcrop Quarry	Quarry Pit	Reduction Scatter	Rock Ring	Rock-shelter	Other[d]	Total
0	0	0	-	1	2	-	3	4	-	63	1	-	-	74
0	0	1	-	-	-	-	-	-	-	5	-	-	-	5
0	1	0	1	-	-	-	-	4	1	18	-	-	-	24
0	1	1	3	-	-	-	-	1	10	2	-	-	-	16
1	0	0	2	1	1	1	-	-	2	6	1	2	1	75
1	0	1	-	-	-	-	-	-	-	1	-	-	-	1
1	1	0	-	-	-	-	-	1	-	2	-	-	-	3
1	1	1	-	-	-	-	-	-	-	16	-	-	-	16
Total			6	2		1	3	10	13	171	2	2	1	214

Sampling Strata			**Feature Density** *(Density Per Acre Surveyed)*											
Slope[a]	Stone[b]	Water[c]	Cairn	Cobble Aggregation	Cobble Quarry	Isolate	Linear Rock Alignment	Outcrop Quarry	Quarry Pit	Reduction Scatter	Rock Ring	Rock-shelter	Other[d]	Total Density/ Acre
0	0	0	-	.001	.002	-	.003	.004	-	.057	.001	-	-	0.067
0	0	1	-	-	-	-	-	-	-	.086	-	-	-	0.086
0	1	0	.007	-	-	-	-	.029	.007	.133	-	-	-	0.177
0	1	1	.039	-	-	-	-	.013	.129	.026	-	-	-	0.206
1	0	0	.002	.001	.001	.001	-	-	.002	.049	.001	.002	.001	0.058
1	0	1	-	-	-	-	-	-	-	.013	-	-	-	0.013
1	1	0	-	-	-	-	-	.010	-	.021	-	-	-	0.031
1	1	1	-	-	-	-	-	-	-	.206	-	-	-	0.206
Feature Class Density across Sample Universe (n/2929.4 acres surveyed)			.002	.001	.001	.0003	.001	.003	.004	.058	.001	.001	.0003	.073

[a]Slope 0=Quadrat mean slope is <=6%
1 = Quadrat mean slope is >6%

[b]Stone 0=Quadrat contains no toolstone source
1 = Quadrat contains toolstone source

[c]Water 0=Quadrat lies more than 560 m from a water source
1 = Quadrat lies within 560 m of a water source

[d]Aggregation of chunky debitage

Generally, feature densities are highest near toolstone and water, regardless of slope gradient, followed by somewhat lower densities where toolstone and water sources are disjunct. It is important to note, however, that the association between high feature densities and toolstone availability is established chiefly by quadrats adjacent the principal Quarries (cf. Figure 16). Silicification zones mapped well beyond the Quarries boundaries rarely are associated with high feature densities, further confirming our observation that these zones offered few quarrying opportunities. Indeed, quarrying features recorded during survey cluster chiefly (76%, n=17) around the large opalite outcrops immediately adjacent the Tosawihi Quarries. Only six (26%) quarrying features were observed beyond these core silicification zones, and these are characterized by relatively ephemeral use. Where significant aggregations of features do occur in the outlying regions of the Class II region, *relative* proximity to water (usually within 1 km), not mapped silicification zones, appears to be the critical determinant (see below).

Not surprisingly, cairns (usually mounds of opalite cobbles near quarry pits), quarry pits, and outcrop quarries tend to be most common in quadrats with toolstone; again, these quadrats are those containing the large mapped toolstone sources closest to the Quarries. The presence of such features in quadrats that originally were stratified as containing no toolstone, indicates the discovery of previously unknown, minor toolstone sources. Reduction scatters are found most frequently in toolstone-rich quadrats (primarily adjacent the Quarries), confirming our proposition that reducing toolstone bulk near the place of extraction, as a cost-efficient strategy, should be common.

Because rarity of certain feature types disallowed the application of a standard chi-square test for examining the distribution of all feature types across sampling strata, we examined only two basic classes of features, reduction scatters and all other outcrop quarrying-related features (counts for outcrop quarries and quarry pits were collapsed). The distribution of reduction scatters and quarrying features is associated significantly with slope, toolstone, and water availability (chi-square=10.35, 26.67, 15.66, respectively; $p<.005$ in all cases). Particularly strong associations (and hence those contributing substantially to the significant chi-square result) include quarrying features on slopes less than 6% (almost all major silicification zones are on gentle slope), and reduction features that lie on steeper slopes in quadrats without toolstone, and/or away from water. Thus, reduction of toolstone was not restricted to locations with immediate (that is, less than 560 m distant) access to water, nor was it tethered to nearby toolstone or easy topography. As pointed out above, however, access to water within a kilometer, or so, appears to have conditioned clustering of reduction features.

Access to water conditioned other, more diverse activities beyond quarrying and reduction. In the dry Tosawihi uplands, we logically surmised that water sources might be critical residential activity loci. Acknowledging that surficial examination, without excavation, might make assignment of "residentiality" difficult (cf. Leach 1992), we undertook a qualitative evaluation of a wide range of potential residential contexts. We briefly examined a judgmental sample of seventeen mapped (on 7.5′ USGS quads) and unmapped water sources (most of them running well in June) for evidence of prehistoric use. Eighty-two percent (n=14) revealed substantial usage, supporting artifact scatters ranging from 4,000 m^2 to 117,000 m^2 (average size=38,670 m^2, where size could be estimated from cursory examination). All spring site assemblages were dominated by opalite reduction debris, occasionally characterized by high color variation suggesting multiple toolstone sources for the raw material reduced at these locations. Other material types, including basalt and obsidian, often were represented, as well. Mid-to-late stage biface reduction debris almost exclusively characterized the debitage component of these assemblages, and heat-treatment was commonly manifested. Assemblage diversity tended to be high, with ubiquitous, mid-to-late stage bifaces, projectile points and preforms, and occasionally rarer implements such as drills, shaft abraders, and millingstones. Such variable maintenance/processing tools, multiple reduction features (at seven of the occupied sites), and a relatively rare hunting blind at one spring suggests repeated, though short-term, multi-functional usage.

Similarly complex and diverse features recorded in Class II quadrats were invariably adjacent ephemeral springs or watered drainages. Four such features contained assemblages with millingstones and diverse raw material types; these may well prove (if excavated) to contain short-term residential components.

The distribution of potentially residential sites appears unrelated to the availability of nearby toolstone sources. As we have seen, outlying silicification zones were used infrequently, while all major water sources were occupied intensively. Because Class II springs lie within relatively easy travelling distance of the far superior toolstone sources of 26Ek3032, it is likely that diurnal quarrying trips were mounted from these locations. The high-quality middle to late stage opalite reduction debris (often heat-treated) that dominates their assemblages establishes their place in a wide-ranging Tosawihi production system, originating at the Quarries.

Summary and Conclusions

The Class II lithic assemblage represents an extension of the same homogeneous production trajectory revealed at the Quarries. Spatial variability in the distribution of bifaces is patterned predictably, revealing key aspects of the organization of lithic production at Tosawihi. Large proportions of bifaces (particularly early stage bifaces) were discarded nearer the Quarries, where they were being produced and broken in manufacture. Later stage bifaces, on the other hand, tended to be produced and discarded in the more distant environs of the Class II universe. Yet the continuing presence of early stage biface forms and middle stage reduction debris, out to the limits of the study area, suggests that the Class II region was still well within a unified "zone of production."

Silicification zones in the Class II study area were remarkably underused relative to outcrops observed in the heart of the Quarries. The quality, size, and location of opalite outcrops appear to have influenced whether or not zones were used as toolstone sources and determined the intensity and type of extraction methods that were applied at them. Mapped silicification zones often were smaller and poorer in quality than those opalite exposures exploited in the principal Quarries.

Too, the persistent use of Quarries facilities (for example, old quarry pits) and bedrock exposures may well have attracted repeated *re*use (thereby allowing exploitation of the fruits of prior quarriers' efforts). Scavenging for usable toolstone in old quarry pit berms, using old hearths and other facilities, may have provided a more cost-effective method of toolstone extraction (cf. Elston et al. 1992). In many instances, it may have been cheaper simply to return to the Quarries for toolstone than to initiate new exploitation of previously untapped (and probably disappointing) sources beyond the Quarries peripheries.

Debitage density, feature density, and artifact density in previously surveyed Tosawihi study areas were substantially greater than those observed in the Class II study area. Proximity to the heart of Tosawihi Quarries, conditioned significantly the density of archaeological remains in the upland region; quadrats adjacent the northern boundary of the Quarries, in particular, yielded higher densities of artifacts, features and debitage than those seen throughout most of the rest of the study area (see Figure 16).

Proximity to the high quality toolstone sources of 26Ek3032, then, may be considered a key variable in predicting the character/density of remains. As one achieves even modest distance from the heart of the Quarries, feature density declines dramatically (Table 8).

Table 8. Density of Prehistoric Features Recorded in the Tosawihi Environs.

Survey	Acres Surveyed	Number of Features Recorded	Feature Density (per acre surveyed)
Tosawihi Quarries	823	322	.39
Eastern Periphery	170	183	1.08
Western Periphery	480	153	.32
Class II	2,929	214	.07

The Tosawihi Quarries exhibited 322 prehistoric features and feature clusters (Elston, Raven, and Budy 1987). At a density of .39 features per acre surveyed, Quarries features are over five times more dense than the prehistoric remains discovered in the Class II study area (214 prehistoric features at a density of .07 features per acre surveyed). Preservation of discrete, surficially observable features may be largely a factor of depositional processes and/or recency of deposition. Nonetheless, it is doubtful that depositional processes within an 8-10 km radius (to the limits of the Class II study area) of the Quarries would have been variable enough to account for such dramatic differences in feature density.

Historic Use of the Region

by C. Lynn Rogers

We have little evidence of historic events occurring in the study area prior to the 1860s. Peter Skene Ogden *may* have passed through the immediate vicinity on his beaver-trapping expedition of 1828-29 (Elliot 1984:35), and in the 1840s and 1850s, thousands of immigrants headed for California and Oregon followed the Humboldt River corridor through this part of then "Utah Territory." Though the Humboldt River lies some 30 miles south of Tosawihi Quarries, use of the study area may have occurred at that time, as intensified EuroAmerican occupation displaced Western Shoshone and Northern Paiute people along the Humboldt River. Known historic uses of the Tosawihi Quarries region from the 1860s to present include cattle ranching, sheep production, hunting, and mercury mining.

Two recent studies shed light on Western Shoshone groups and their use of the Quarries from the mid-1800s to the present (Clemmer 1990; Rusco and Raven 1991). Shoshone activities at Tosawihi Quarries, reported in a recent ethnographic study, included collecting opalite, rhyolite tuff, and plants, hunting, visiting power spots, and buckarooing for local ranches (Rusco and Raven 1991:13, 27-29).

Ranching Industries

Cattle and sheep ranching have been significant industries in Elko County since at least the 1870s. According to Bancroft (1981:275), Elko County contained the most good agricultural and grazing land among all Nevada counties. In 1880, 200,000 lbs of wool were shipped from Battle Mountain, an impressive indication of local sheep populations (Bancroft 1981:248). Tosawihi Shoshone were employed by local ranches, including the Betty O'Neill, Hadly, 25, Spanish, Izzenhood, YP, and Packer ranches during the twentieth century (Rusco and Raven 1991:13, 27).

There are no ranch headquarters in the immediate study area, but the entire region is grazed by fee arrangement with the Bureau of Land Management. Ranches lie to the north, to the west and southwest along the Humboldt River, and to the east, near Dunphy. Very likely, the ranchers in the lowlands transfer cattle to the upland Ivanhoe District for summer forage.

Mining Uses

At Tosawihi, mercury ore deposits lie in beds of cryptocrystalline silicate (opalite) or along steep vertical faults. Cinnabar was discovered in the district by W.F. Roseberry and W.C. Davis in 1911. The Ivanhoe

Mining District (Figure 17) was organized circa 1915 (Lincoln 1982:47), and commercial production began that same year, at which time numerous claims were staked and a 6-pipe Rocca retort was installed. Production continued from 1915 until the end of World War I (Zeier 1987:6); 20 to 50 flasks of mercury were produced by 1917.

Mining in the Ivanhoe District resumed in 1929, and continued through the 1940s. Most 1930s mercury was extracted from the Butte Quicksilver Mine (including the Velvet, Clementine, and Butte claims), with the second largest producer being the Governor Mine. The World War II era was the most productive period of all at Ivanhoe, when the Silver Cloud Mine gained prominence as the largest producer (some 700 flasks by 1943). Operations were intermittent from 1943 to 1947 (Zeier 1987:6).

Mercury production ceased from 1947 to 1957, when, for the next five years, cinnabar mining was pursued in response to rising international mercury prices. This time, little profitable ore could be found at Ivanhoe and only 30 flasks of mercury were produced in the district (Zeier 1987:7-8).

Since the 1970s, gold mining has replaced mercury production in the Ivanhoe Mining District. Present-day development centers on open-pit gold mining and heap-leach processing.

Cultural Remains

Of all the historic and current activities mentioned above, only a few are visible in the archaeological remains encountered during our Class II survey of 1991 (Table 9; Appendices D and E).

Table 9. Distribution of Modern and Historic Features Across Sampling Strata.

Sampling Strata			Feature Types (n)										
Slope[a]	Stone[b]	Water[c]	Cairn	Historic Camp	Historic Dump	Historic Road[d]	Historic Wall	Mining Feature	Modern Road[d]	Other Historic	Other Modern	Pit, Unknown Function	Total
0	0	0	-	1	10	2	-	42	14	1	2	1	73
0	0	1	-	-	-	-	-	-	3	-	1	-	4
0	1	0	-	-	-	-	-	7	5	-	-	-	12
0	1	1	1	-	-	-	-	7	5	-	1	-	14
1	0	0	1	-	5	3	2	51	10	-	3	1	76
1	0	1	-	-	-	-	-	-	-	-	-	-	0
1	1	0	1	-	-	-	-	11	-	-	-	-	12
1	1	1	-	-	-	-	-	1	-	-	-	-	1
Total			3	1	15	5	2	119	37	1	7	2	192

[a]Slope 0=Quadrat mean slope is <=6%
1 = Quadrat mean slope is >6%

[b]Stone 0=Quadrat contains no toolstone source
1 = Quadrat contains toolstone source

[c]Water 0=Quadrat lies more than 560 m from a water source
1 = Quadrat lies within 560 m of a water source

[d]Historic or modern roads have been counted whenever they crosscut an individual quadrat. Thus, the same feature may have been counted two or more times across different quadrats.

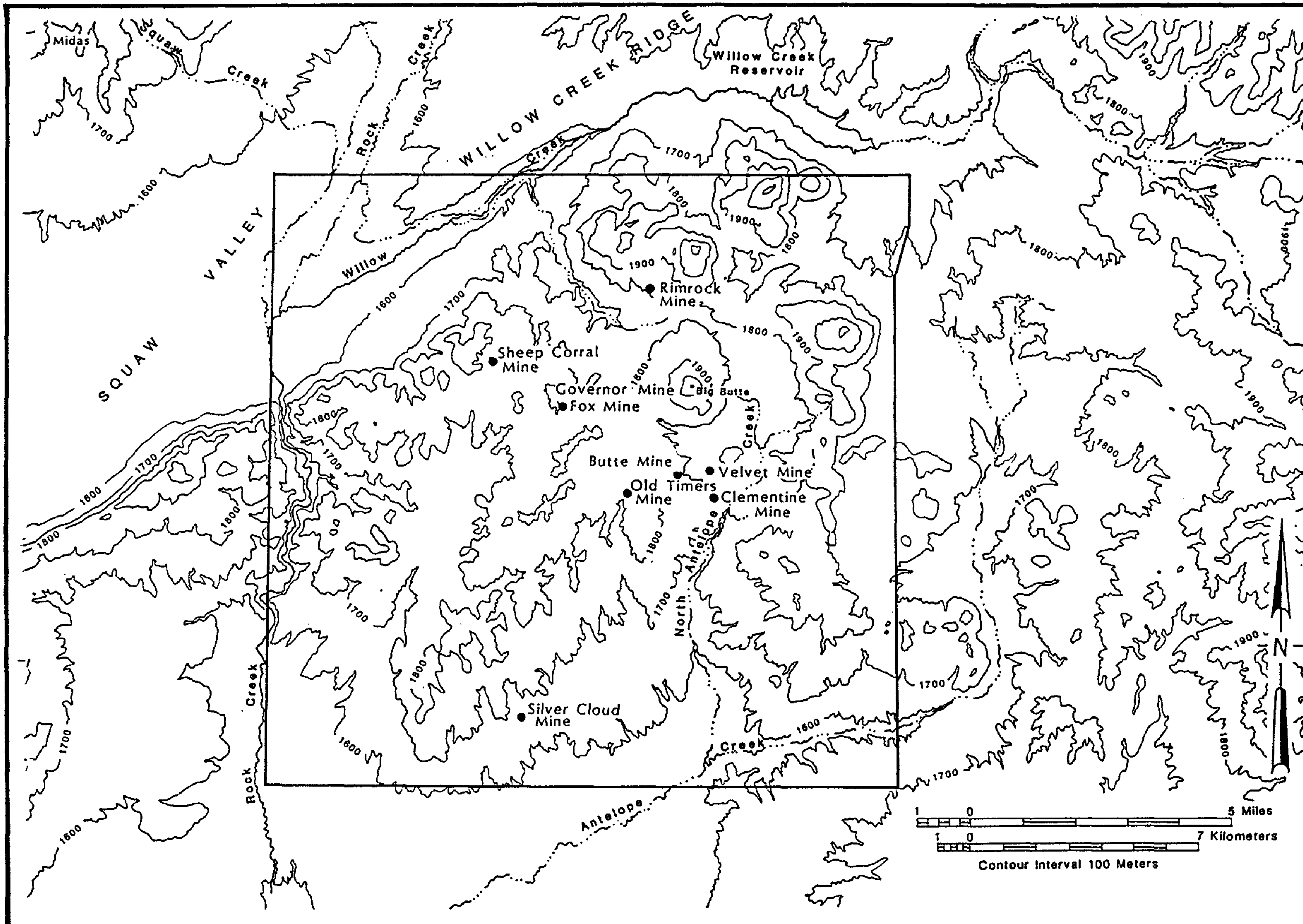

Figure 17. The Ivanhoe Mining District.

Mercury prospecting/mining features and artifacts attributable to the 1930s, 1940s, and 1960s were observed. Modern prospecting, drilling, road-building, and waste-rock dumps, associated with gold extraction, are ubiquitous and were encountered frequently during survey. Cattle-ranching features and artifacts were observed occasionally. No remains identified during Class II survey are definitely attributable to such activities as hunting, rock-collecting, artifact-collecting, visiting of sacred places, or very early prospecting/mining.

Ranching Features

Several kinds of features were recorded that can be attributed to cattle management, including post and barbed wire fences, small earthen dams, ponds, and reservoirs. Five earthen dams, all on small drainages, were encountered, three of them at springs within drainages. Three dams lie in the south half of the study area, well removed from historic mining features, while the two northern dams are very near clusters of historic mining remains. Food and tobacco cans were observed at three of the water-collection features. Fences were encountered occasionally during survey.

Of the 15 historic artifact "dumps" encountered during Class II survey, none can be tied directly to ranching. However, two can clusters might be the remains of temporary "cow camps", since they are distant from all mining features. One is located directly north of Big Butte, while the other lies in the southwest sector of the study area.

Mercury Mining Features

Features considered related to mercury mining and milling include prospect pits, waste rock mounds, tailings mounds, bulldozer cuts, dry-laid stone walls, earthen platforms, adits, shafts, roads, machinery complexes, furnaces, retorts, large open pits, and domestic and industrial debris clusters. Several such features were observed during Class II survey.

During field recording, crews made rough assessments of the age of mine, mill, and prospect features on the basis of several criteria. The type of feature (hand-dug pit or adit vs. bulldozer scrape or trench), the degree of revegetation on a feature (fresh and bare bulldozer cut versus overgrown ones), and the association of datable artifacts with the feature (rebar versus hole-in-cap cans) were considered in making field calls.

Based on the temporal criteria noted above, distinct patterns of feature distribution are apparent within the study area boundaries. Twenty-one "older" mercury mining features, presumably dating from ca. 1911 to ca. 1947, are clustered in an arc, curving from the southwest to the west of Big Butte. The arc begins at Antelope Spring (for the purposes of this survey), continues north of the Old Timer's Mine, then southwest of the Fox and Governor mines, and ends just east of the Sheep Corral Mine. This pattern of old prospect pits and cuts probably continues east of Antelope Spring, into the old Butte, Velvet, and Clementine mine areas. No Class II survey parcels were located in this area, disallowing any test of this hypothesis.

Artifacts commonly associated with the older mercury mining features include food, tobacco, and kerosene cans, glass bottles, wash basins, iron barrels, metal and canvas machine parts, and structural materials; corrugated tin sheets, wire, iron pipe, milled lumber, wire nails, and fire brick. The most numerous can types include sanitary food cans (1903 to present), venthole-type evaporated milk cans (ca. 1900 to 1960s), and pocket tobacco cans (1913 to 1970s) (Rock 1984:100-105).

Newer mercury mining features consist of bulldozer scrapes and trenches, presumably dating to the 1960s period of mercury extraction and exploration. We suspect that most modern gold prospecting consists of exploratory drilling, rather than of surface trenching. A discernible pattern of bulldozer cuts is apparent within the survey area: bulldozer cuts (n=64) were observed in 32 of the 151 Class II survey quadrats. Six such features occurred in the south half of the study area, in five quadrats. The remaining 27 quadrats, or 84% of those with bulldozer cuts, lie in the north half of the survey area, to the southwest, west, and northwest of Big Butte. Cut features are especially numerous around Antelope Spring, near the Sheep Corral Mine, and in a north-south corridor between the Old Timer's Mine and Ivanhoe Creek.

An extensive mercury milling complex, thought to be a 1960s vintage rotary furnace, was observed. The unnamed mill is located in ca. 0.75 mi east of the Sheep Corral Mine, and includes numerous terraced platforms connected by haul roads, a rotary furnace, a retort(?) consisting of 72 vertical iron flues 25 ft in height, a large tailings mound, two waste rock mounds, and a large industrial dump consisting of lumber, huge hoses on wooden wheels, bins, chutes, plywood, and heavy cable.

Additional mercury mine/mill complexes were noted during survey, but were not recorded in detail. Though they fell outside sample quadrats, they are worthy of brief mention. At Buttercup Spring, stone foundations for at least two small buildings, and cinder block and brick remains of a third, industrial structure were observed. Much domestic debris near the spring also was noted, suggesting an early twentieth century mercury processing camp complex.

Imposing remains of a second cinnabar mine and mill complex, known as the "Jackson and Surprise claims" lie 1 mi southwest of the Old Timer's Mine (Garside 1982:1). The "mine" is an open, rectangular cut in the hillside, perhaps 60 ft long by 20 ft wide, with a nearby rotary furnace. The complex probably dates to the 1960s. According to Garside (1982:1), the rotary furnace post-dates 1944 reports about the claims.

Other prominent complexes, such as Butte 1, Butte 2, Velvet, and Clementine mines have been reported elsewhere in detail (Zeier 1987).

Historic Artifacts

A total of 357 historic artifacts was tallied for all surveyed quadrats. Of the 151 sample quadrats, only 43 (29%) contained historic artifacts, and 72% (n=257) of the artifacts are concentrated in only four quadrats. Tin cans account for 51% of all recorded artifacts (n=182). The next largest group consists of structural materials, accounting for 24% (n=87) of the total. The artifact clusters reflect intensive mercury mining and milling locations; they provide dramatic contrast to surrounding portions of the study area. And the concentrations confirm that a significant historic use of the quarry area has been mercury prospecting, mining, and milling.

Chapter 6. AN EVALUATION OF THE PROPOSED TOSAWIHI QUARRIES NATIONAL REGISTER DISTRICT BOUNDARY

A proximal aim of the Class II survey was to aid an assessment of the Tosawihi Quarries National Register District boundary defined by Mary Rusco (1983). Criteria employed by Rusco to establish the limits of the district in the infancy of Tosawihi study anticipated many of the issues that would drive future research there. She proposed boundaries that were designed to "...enclose a natural geological district (occurrences of the silica-replaced rhyolites)...", "...to include all loci where surface occurrences of the knappable stone were quarried...", and "...to include associated campsites..." (Rusco 1983). To her credit, these criteria continue to provide useful general guidelines for predicting where Tosawihi-related archaeology may be found in the landscape. They fall short only in that they fail to describe the full geographic extent of such remains.

Appropriateness of the 1983 district boundary was evaluated in terms of the degree to which its original configuration subsumes archaeological locations demonstrated to be of particular relevance to the address of questions pertinent to Tosawihi Quarries research (Elston et al. 1992). We succeeded in determining that, as currently drawn (Figure 18), the boundary of the district does not enclose adequately the extent of archaeological locations that characterize Tosawihi prehistory. Subsequent inquiry has refined the notion of what constitutes the importance and uniqueness of Tosawihi archaeology. Today we can identify how such remains look on the ground and how they may be used to differentiate Tosawihi-specific phenomena from other aspects of prehistoric land use in the region.

Results of work in and around the Tosawihi Quarries site since 1987 assert that the distinctive theme in the prehistoric occupation of the area derives from its well-preserved record of lithic *production*. Toolstone *use*, by contrast, appears to contribute little to the record there (cf. Elston and Raven 1992). By this we mean that, although opalite constitutes the principal raw material used for tool manufacture over a broad expanse of the Upper Humboldt River region, the overwhelming predominance of remains created during toolstone procurement and early stage preparation of the stone distinguish the archaeology of the Tosawihi vicinity from that of its immediate surroundings. It is the potential for Tosawihi archaeology to inform about lithic production as one aspect of prehistoric economy that imparts significance to the place in terms of the National Register.

For purposes of the Class II exercise then, identification of appropriate boundaries for the district hinged on our ability to differentiate between remains characteristic of "zones of production" and those reflecting "zones of use". This dichotomy has played a central role in interpretation of the Tosawihi record undertaken so far and the theoretical underpinnings, archaeological consequence, and explanatory utility of this perspective is discussed fully in earlier documentation (Elston 1992c). Briefly, we view production and use as behavioral extremes that bracket the full range of opalite-focused activities undertaken by aboriginal occupants of the region. Toolstone production and toolstone use encompass different sets of chores, each motivated by different goals, and as a result, each is expected to manifest a distinctive archaeological signature (Elston et al. 1992).

Data in hand reveal unambiguously that, at Tosawihi, lithic production means biface production (Elston 1992a). With the creation of bifaces as its goal, lithic production at Tosawihi is manifest by the remains of behaviors that reflect toolstone extraction, rendering of the stone into portable forms (bifaces), and transport of raw material away from the source areas.

As we have argued, the bulk of the record within the zone of production reflects the outcome of a complex suite of strategies (mobility patterns, labor organization, and technology) manipulated to minimize the various *costs* and *risks* inherent in toolstone production. Archaeologically, these strategies are signalled by the exploited opalite sources themselves and the accumulations of toolstone processing debris accrued during biface manufacture. Opalite waste overwhelmingly dominates site contents, few formed artifacts other than failed bifaces occur, and tools indicative of maintenance/subsistence tasks are relatively rare. In the few instances where sites of apparent residential function occur, most seem to have served as the venue for subsistence chores that supported groups otherwise preoccupied by toolstone procurement (Leach 1992).

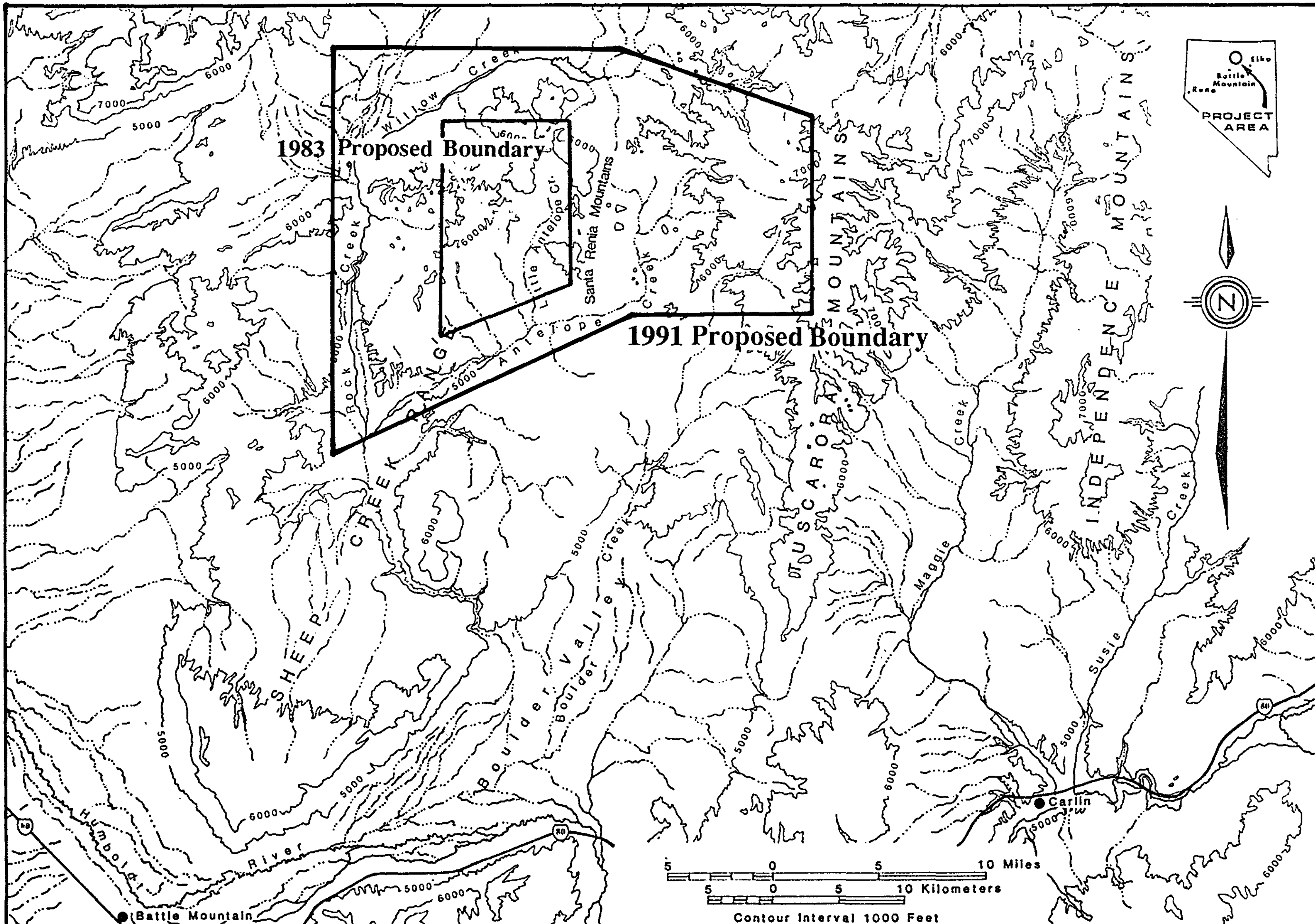

Figure 18. Proposed expansion of the Tosawihi Quarries National Register District.

An emphasis on lithic production is displayed by the predominance of bifaces within assemblages and by the character of their debitage collections (Bloomer, Ataman, and Ingbar 1992; Bloomer and Ingbar 1992). Bifaces tend to be reduced more fully and more commonly manifest signs of heat-treatment as distance from toolstone source increases, presumably a reflection of the sequential processing of stone during transport.

We observe, however, that evidence of biface use (edge damage, debitage indicative of sharpening, repair, etc.) is virtually absent. *This observation is important for purposes of boundary definition.*

Within the zone of use, by contrast, opalite-focused behavior involves the application of the stone to tasks that convert energy from the environment into useful forms for human benefit. Here, costs incurred during opalite production are compensated when the utility of the stone is realized through use. The stone may confer benefit directly as a food-getting tool or as a tool used for the manufacture of other implements, or it may be applied indirectly to the acquisition of an array of desired ends, from sustenance to sex, through trade.

Archaeologically, site contents in the zone of use should reflect general use of the landscape—residential bases, temporary camps, or special-purpose locations, for example—where people engaged in myriad tasks other than toolstone production. Employing models of toolstone transport, we can assert that most toolstone should arrive at the zone of use in a highly processed state (cf. Elston 1992a). Opalite components of assemblages should be dominated by utilized forms and the waste accrued through their use, maintenance, and eventual discard. Proportions of tools to lithic waste should be high and most of the material should display evidence of heat-treatment.

The divergent archaeological signatures of toolstone *production* and toolstone *use* and the demonstrated importance of the former as a hallmark of what is significant about the Tosawihi record give us a model from which we can advance a geographic limit. The task of boundary assessment via the Class II survey, then, became one of determining how well the district, as presently defined, corresponds to that piece of landscape whose archaeological content relates most directly to lithic production activities. In a word, survey results indicate that, indeed, it does not correspond well.

Class II survey monitored the archaeological content of 151 19.4 acre sample quadrats within the 28,480 acre study area, a tract coterminous with that defined by Rusco as the proposed National Register district. Throughout the course of fieldwork, we found ourselves everywhere *within* an area whose archaeological character corresponds to that predicted for a zone of production, but in none of the areas examined did we encounter the *limits* of such a zone.

Across the full compass of the sample universe, artifacts observed in quadrats pertain overwhelmingly to the extraction and processing of opalite raw material. Furthermore, we observed utilized mapped silicification zones (potential toolstone sources) throughout the study area and considerably beyond the current district boundary. At examined water sources, presumably attractive for offerings other than chert, assemblages appear to derive predominantly from opalite processing even when far removed from opalite supplies. Maintenance/ subsistence components of these locales, although occasionally abundant, appear to reflect tasks ancillary to more dominant toolstone processing functions (like comparable remains at similar sites studied in the heart of the Quarries (cf. Leach 1992; Leach, Dugas, and Elston 1992).

Thus, overall results reveal that the district boundary is inadequate as presently drawn. The district is too small, failing to enclose a sufficient complement of remains demonstrated to be significant for interpreting Tosawihi prehistory. We conclude that a more appropriate boundary lies elsewhere, beyond the limits of the Class II study area. Survey results corroborate many of our general impressions about the kinds of aboriginal behaviors that produced the distinctive archaeology of the Tosawihi vicinity, and validate the importance of questions that have guided research there so far. These results, along with the growing body of archaeological data that has accrued over the last several years elsewhere in the Upper Humboldt region, suggest where more realistic boundaries for the district might be found.

We propose modification of the district boundaries to capture more fully the zone of lithic production affiliated with the Tosawihi Quarries. Such a change necessitates expansion of current boundaries outward into portions of the landscape we *expect* to contain evidence of a shift in opalite focused behaviors from production to use.

Such a proposition might appear to offer little to resolution of the boundary issue given the vast extent of the area where white chert raw material dominates prehistoric tool kits (Stephenson and Wilkenson 1969; Rusco 1976a, b, 1978, 1979, 1982). Ethnographic accounts and extant archaeological data, however, allow us to narrow considerably the area that we propose contains a more appropriate district boundary.

We assume that Shoshone winter camp locations plotted by Steward (1938) along the Humboldt River and the lower reaches of its major tributaries must lie fully within the zone of toolstone use. These locations should be excluded from consideration as part of a district defined by lithic production. On similar grounds, opalite components of assemblages derived from locations at comparable distances from Tosawihi such as the Valmy sites (Elston et al. 1981), Treaty Hill (Davis, Fowler, and Rusco 1976; Rusco and Davis 1979), James Creek (Elston and Budy 1990) and others (cf. Raven 1992a) pertain overwhelmingly to toolstone use and likewise lie far outside a suitable district boundary. Description of assemblages from lower Rock Creek and lower Boulder Creek, although nearer the Tosawihi sources, imply that these areas also constitute zones of toolstone use rather than production (Botti 1985; Clay and Hemphill 1986).

Models of toolstone procurement offer further assistance in our efforts to define geographically specific district boundaries. These models predict that, on a regional scale, the transition from the dominance of toolstone production to toolstone use should occur relatively near the opalite sources (cf. Elston 1992a). We assume that rational foragers will recoup the costs of toolstone production by converting the potential benefits of the stone into consumable gains through its use as soon as and as near its point of procurement as subsistence opportunities allow. Although we control little empirical data with which to support this assumption, we expect archaeological evidence for the interface of the zone of production and the zone of use to coincide with changes in the resource complement of the landscape.

Translation of an area so defined onto the Tosawihi landscape constitutes our best approximation of more appropriate district boundaries. On this basis, we propose a district redrawn to enclose an expanse of ca. 770 square kilometers centered on the Tosawihi Quarries site, 26Ek3032, with boundaries that correspond to drainages of principal tributaries of the Humboldt River surrounding the Tosawihi uplands (see Figure 18). The new district would be bounded on the west by Rock Creek, on the north by Willow Creek, and on the south by segments of Antelope Creek and Boulder Creek. Eastern limits of the district subsume the western foothills of the Tuscarora Mountains drained by influent streams along the upper reaches of Boulder and Antelope Creeks.

This considerable expansion of the district is justified by the demonstrated importance of toolstone processing and transport to an understanding of lithic production at Tosawihi. In economic and technological terms these elements provide the link between opalite extraction and opalite use. The revised boundary constitutes the geographical expression of this linkage.

We possess first hand knowledge of the archaeological content of few places within the expanded district. These data and the observations of our colleagues working nearby (P-III Associates, Inc., personal communication 1991) offers circumstantial support for the assertion that lithic production continues to be the dominant theme of prehistoric land use for a considerable distance beyond the boundaries defined by Rusco.

Our observation that suitable limits for the proposed district lie beyond the Class II study area derives in large part from the environmental factors that conditioned prehistoric use of the place. Artifactual evidence and ecological inference suggest that, due to the meager subsistence opportunities offered by the countryside immediately surrounding Tosawihi, the area probably seldom inspired visits by aboriginal foragers except for those intent upon toolstone acquisition (Raven 1992a; Schmitt, Ingbar, and Raven 1992). By contrast, the comparatively well watered, game-rich riparian corridors along the drainages selected as new district boundaries constitute the places nearest the quarries where subsistence opportunities improve markedly. Here we expect to see a transition in land use patterns reflecting increased emphasis on toolstone use.

Over the course of Tosawihi-focused work we have had the opportunity to examine closely only one site within these more productive habitats, site 26Ek3251. Located 10 km north of the quarries at the confluence of Ivanhoe and Willow Creeks, testing and data recovery were undertaken there as part of the mitigation program for the northern main access road to the Hollister mine (Schmitt and Dugas 1992). This work provided an opportunity to examine changes in the archaeological record along a continuous transect parallelling Ivanhoe Creek and spanning the full distance between the opalite sources and one of the perennial drainages proposed for consideration as a revised district boundary.

Although opalite processing remains occur in abundance at 26Ek3251, the site is unique among sites so far investigated for the extent to which it displays evidence of opalite use. Composition of the recovered assemblage suggests subsistence and maintenance functions for the site to a degree unprecedented for sites examined in less provident environmental contexts (Leach 1992; Ingbar 1992). Rather than a processing locus with evidence of minor ancillary residential use like those we have seen closer to the toolstone sources (cf. Leach 1992), site function at 26Ek3251 appears to derive from more general use of the landscape in which opalite processing plays only a part. The overall character of the site is what we would expect: a location at the limit of the sphere of toolstone production.

Examination of other sites along Ivanhoe Creek reveals that as toolstone sources upstream are approached, site contents revert rapidly to the remains of toolstone processing. A similar pattern prevails near the proposed southern limit of the redesigned district. Sites along Little Antelope Creek near its confluence with Antelope Creek, though known from survey level descriptions provided by others (Stoner and Peterson 1990), appear to represent transitional locations where toolstone use supplants toolstone production.

Eastward expansion of the district is predicated on the findings of investigations in Boulder Valley and the western foothills of the Tuscarora Mountains (Hicks 1989; Rafferty and Blair 1988; Russell, Tratebas, and Schroedl 1986; Schroedl 1986; Tipps 1989). From our reading of results of survey and limited testing, site rosters there are dominated by chert processing loci. Investigators report, however, numerous locations where these remains are highly augmented by maintenance and subsistence assemblages (P-III Associates, Inc., personal communication 1991). Most of the very few collections from the area we have seen resemble the one obtained from 26Ek3251. Further, ultraviolet characterization of the materials suggest that much of the white chert in sites in the Boulder Valley area is derived from sources at the Tosawihi Quarries (Kathy Ataman, personal communication 1991; Doug Bird, personal communication 1991; Ataman and Botkin 1991).

Chapter 7. CONCLUSIONS

Tosawihi Quarries was central to a region exploited by Shoshone people during spring and summer (Elston 1992a). The Quarries were within the daily travel radius of foraging camps on Willow Creek, Rock Creek, Little Antelope Creek, Antelope Creek, and Ivanhoe Creek (Elston 1992a), drainages that encompass the Class II study area. The study area, then, would have been traversed regularly by people approaching and leaving the Quarries, and indeed, archaeological patterning in our sample demonstrates a clear relationship between the outlying uplands of the Class II study area and the toolstone sources at the heart of Tosawihi.

At the outset of this report, we advanced several general expectations about the nature and distribution of the Class II archaeological record. These expectations were derived from our earlier research at Tosawihi Quarries and were founded on fundamental principles of cost-minimization. We expected the Class II record to reflect, as did the record at the main Quarries, a prehistoric concern for reducing effort in toolstone extraction and toolstone transport. We believe we have found evidence that supports well this contention.

High proportions of bifaces were prepared, broken in manufacture, and discarded in the immediate vicinity of the main Quarries. Most of these were early stage bifaces, with relatively few late stage bifaces finding their ultimate destination in this zone. Instead, later stage forms were discarded farther away, in settings where they were undergoing heat-treatment and being reduced further. Reduction features were densest in the zone immediately around the principal Quarries, declining rapidly as distance away from the Quarries was attained.

The broad distribution of medium-sized debitage and Stage 2 and 3 bifaces suggests that the Class II environs were well within a large zone of lithic production, originating at the Quarries. Occasionally, we found maintenance and non-lithic resource processing tools—weapons, flake tools, millingstones, exotic materials—relating to concerns other than raw material extraction. Such items often were clustered at springs and attendant campsites used, very probably, in the support of people visiting the Quarries for toolstone procurement (cf. Leach 1992; Elston 1992a).

Mapped silicification zones away from the heart of the Quarries or their extension immediately to the east were notably underused. Their generally lower quality, inaccessibility relative to water, and small size may have impaired their attraction to prehistoric quarriers. In contrast, the principal Quarries, near good water, offered massive expanses of outcropping toolstone which, when assayed and excavated for millennia by quarrying groups, would have presented lower-cost and increasingly accessible toolstone deposits.

We have concluded our examination of the Class II study area with the certainty that we have not isolated the principal realm of lithic production that originates at Tosawihi Quarries. The Tosawihi zone of production is large, complex, and subsumes, but is not defined by the Class II survey universe boundaries. We suggest that use of the Class II region was related overwhelmingly to procurement of toolstone rather than to intensive exploitation of other non-lithic resources. We recommend, therefore, that a proposed Tosawihi Quarries National Register District be expanded to incorporate those lands where the archaeological record similarly reflects lithic *production* of Tosawihi opalite, rather than lithic tool use, as its chief component.

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APPENDIX A. Listing of Potential Survey Quadrats in the Study Universe (n=1446)

Quadrat North	Number East	% Grade	Slope 0 <=6% 1 >6%	Toolstone 0-has no ts. 1-has ts.	Water 0-water>560m 1-water<560m	Combined Score (slope,ts,water)
0	0	4.3	0	0	0	0
1	0	5	0	0	0	0
1	1	5.5	0	0	0	0
1	2	4.3	0	0	0	0
2	0	6.9	1	0	0	100
2	1	5.1	0	0	0	0
2	2	4.6	0	0	0	0
2	3	4.2	0	0	0	0
2	4	3.2	0	0	0	0
3	0	8.4	1	0	0	100
3	1	4.5	0	0	0	0
3	2	5.1	0	0	0	0
3	3	5.5	0	0	0	0
3	4	5.7	0	0	0	0
3	5	5.4	0	0	0	0
3	6	4	0	0	0	0
4	0	6.2	1	0	0	100
4	1	5.7	0	0	0	0
4	2	5.6	0	0	0	0
4	3	6.8	1	0	0	100
4	4	7.1	1	0	0	100
4	5	6.6	1	0	0	100
4	6	5.1	0	0	0	0
4	7	3.9	0	0	0	0
4	8	3.5	0	0	0	0
5	0	7.6	1	0	0	100
5	1	5	0	0	0	0
5	2	6.6	1	0	0	100
5	3	6.3	1	0	0	100
5	4	6.2	1	0	0	100
5	5	6	0	0	0	0
5	6	5.3	0	0	0	0
5	7	4.6	0	0	0	0
5	8	4	0	0	0	0
5	9	4	0	0	0	0
5	10	4.2	0	0	0	0
6	0	8.7	1	0	0	100
6	1	7.3	1	0	0	100
6	2	7.7	1	0	0	100
6	3	7	1	0	0	100
6	4	5.6	0	0	0	0
6	5	4.7	0	0	0	0
6	6	4.5	0	0	0	0
6	7	4.3	0	0	0	0
6	8	3.9	0	0	0	0
6	9	3.8	0	0	0	0
6	10	4.3	0	0	0	0
6	11	5.4	0	0	0	0
6	12	5.7	0	0	0	0
7	0	8.8	1	0	0	100
7	1	8.8	1	0	0	100
7	2	8.9	1	0	0	100
7	3	8.3	1	0	0	100
7	4	5.4	0	0	0	0
7	5	4	0	0	0	0
7	6	4.2	0	0	0	0
7	7	4.5	0	0	0	0
7	8	3.8	0	0	0	0
7	9	3.6	0	0	0	0
7	10	3.9	0	0	0	0
7	11	5.2	0	0	0	0
7	12	4.3	0	0	0	0
7	13	3.6	0	0	0	0
7	14	1.3	0	0	0	0
7	15	1.1	0	0	0	0
8	0	6.2	1	0	0	100
8	1	7.2	1	0	0	100
8	2	8.1	1	0	0	100
8	3	9.9	1	0	0	100

8	4	6.2	1	0	0	100
8	5	5.5	0	0	0	0
8	6	5.9	0	0	0	0
8	7	6	0	0	0	0
8	8	3.9	0	0	0	0
8	9	3.8	0	0	0	0
8	10	3.6	0	0	0	0
8	11	2.9	0	0	0	0
8	12	5	0	0	0	0
8	13	3.2	0	0	0	0
8	14	1	0	0	0	0
8	15	0.6	0	0	0	0
8	16	0.8	0	0	0	0
8	17	1.3	0	0	0	0
9	0	3.7	0	0	0	0
9	1	4.6	0	0	0	0
9	2	7.5	1	0	0	100
9	3	8.1	1	0	0	100
9	4	7.3	1	0	0	100
9	5	7.5	1	0	0	100
9	6	8.1	1	0	0	100
9	7	8	1	0	0	100
9	8	3.5	0	0	0	0
9	9	2.5	0	0	0	0
9	10	1.8	0	0	0	0
9	11	2.5	0	0	0	0
9	12	4.5	0	0	0	0
9	13	3.5	0	0	0	0
9	14	2.2	0	0	0	0
9	15	1.2	0	0	0	0
9	16	0.6	0	0	0	0
9	17	0.3	0	0	0	0
9	18	1.5	0	0	0	0
9	19	5.1	0	0	0	0
10	0	7	1	0	0	100
10	1	6.6	1	0	0	100
10	2	7.8	1	0	0	100
10	3	6.4	1	0	0	100
10	4	5.9	0	0	0	0
10	5	5.8	0	0	0	0
10	6	9.1	1	0	0	100
10	7	9.9	1	0	0	100
10	8	6	0	0	0	0
10	9	3.1	0	0	0	0
10	10	2.1	0	0	0	0
10	11	2.5	0	0	0	0
10	12	3.2	0	0	0	0
10	13	3.5	0	0	0	0
10	14	2.9	0	0	0	0
10	15	1.8	0	0	0	0
10	16	0.7	0	0	0	0
10	17	0.2	0	0	1	1
10	18	0.7	0	0	1	1
10	19	3.2	0	0	0	0
10	20	3.8	0	0	0	0
10	21	3	0	0	0	0
11	0	8.9	1	0	0	100
11	1	8.1	1	0	0	100
11	2	8.4	1	0	0	100
11	3	7	1	0	0	100
11	4	5.2	0	0	0	0
11	5	4.2	0	0	0	0
11	6	6.9	1	0	0	100
11	7	8.5	1	0	0	100
11	8	6.6	1	0	0	100
11	9	4.7	0	0	0	0
11	10	3.5	0	0	0	0
11	11	2.9	0	0	0	0
11	12	2.5	0	0	0	0
11	13	2.8	0	0	0	0
11	14	3.3	0	0	0	0
11	15	2.6	0	0	0	0
11	16	2.1	0	0	0	0
11	17	1.5	0	0	1	1

11	18	1.3	0	0	1	1
11	19	2.6	0	0	1	1
11	20	3.7	0	0	0	0
11	21	3.6	0	0	0	0
11	22	4.1	0	0	0	0
11	23	3	0	0	0	0
12	0	9.2	1	0	0	100
12	1	8.8	1	0	0	100
12	2	9.4	1	0	0	100
12	3	8.5	1	0	0	100
12	4	5.5	0	0	0	0
12	5	2.1	0	0	0	0
12	6	4.5	0	0	0	0
12	7	7	1	0	0	100
12	8	6.4	1	0	0	100
12	9	5.7	0	0	0	0
12	10	5.2	0	0	0	0
12	11	3.8	0	0	0	0
12	12	2.4	0	0	0	0
12	13	2.3	0	0	0	0
12	14	3.9	0	0	0	0
12	15	3.3	0	0	0	0
12	16	3.7	0	0	0	0
12	17	3.2	0	0	1	1
12	18	1.9	0	0	1	1
12	19	2.7	0	0	0	0
12	20	4.2	0	0	0	0
12	21	4.2	0	0	0	0
12	22	4.9	0	0	0	0
12	23	3.8	0	0	0	0
12	24	2.9	0	0	0	0
12	25	4.8	0	0	0	0
13	0	7.2	1	0	0	100
13	1	10	1	0	0	100
13	2	9.5	1	0	0	100
13	3	9.6	1	0	0	100
13	4	7.5	1	0	0	100
13	5	3.6	0	0	0	0
13	6	2.8	0	0	0	0
13	7	5.7	0	0	0	0
13	8	5.5	0	0	0	0
13	9	5.6	0	0	0	0
13	10	6.4	1	0	0	100
13	11	5.4	0	0	0	0
13	12	3.7	0	0	0	0
13	13	3.1	0	0	0	0
13	14	3.7	0	0	0	0
13	15	3.4	0	0	0	0
13	16	4	0	0	0	0
13	17	3.9	0	0	0	0
13	18	2.9	0	0	0	0
13	19	3.3	0	0	0	0
13	20	4.1	0	0	0	0
13	21	4.7	0	0	0	0
13	22	6.7	1	0	0	100
13	23	4	0	0	0	0
13	24	8	1	0	0	100
13	25	10	1	0	0	100
13	26	9.7	1	0	0	100
13	27	9.5	1	0	0	100
14	0	7.2	1	0	0	100
14	1	6.1	1	0	0	100
14	2	6.4	1	0	0	100
14	3	7.1	1	0	0	100
14	4	8.1	1	0	0	100
14	5	6.5	1	0	0	100
14	6	5.9	0	0	0	0
14	7	6.6	1	0	0	100
14	8	6.5	1	0	0	100
14	9	6.3	1	0	0	100
14	10	6.5	1	0	0	100
14	11	6.3	1	0	0	100
14	12	6.2	1	0	0	100
14	13	5.5	0	0	0	0

14	14	4	0	0	0	0
14	15	2.5	0	0	0	0
14	16	2.8	0	0	0	0
14	17	2.9	0	0	0	0
14	18	3.1	0	0	0	0
14	19	3.6	0	0	0	0
14	20	3.4	0	0	0	0
14	21	5	0	0	0	0
14	22	5.1	0	0	0	0
14	23	6.1	1	0	0	100
14	24	11.6	1	0	0	100
14	25	12.8	1	0	0	100
14	26	11.4	1	0	0	100
14	27	9.7	1	0	0	100
14	28	8.4	1	0	0	100
14	29	8.9	1	0	0	100
14	30	9.9	1	0	0	100
15	0	6.6	1	0	0	100
15	1	7.8	1	0	0	100
15	2	6.4	1	0	0	100
15	3	5.7	0	0	0	0
15	4	6.6	1	0	0	100
15	5	6.7	1	0	0	100
15	6	6.4	1	0	0	100
15	7	6.9	1	0	0	100
15	8	7.4	1	0	0	100
15	9	7.3	1	0	0	100
15	10	6.4	1	0	0	100
15	11	5.9	0	0	0	0
15	12	6.3	1	0	0	100
15	13	6.1	1	0	0	100
15	14	5	0	0	0	0
15	15	3.6	0	0	0	0
15	16	3.1	0	0	0	0
15	17	4.2	0	0	0	0
15	18	5.4	0	0	0	0
15	19	5	0	0	0	0
15	20	4.7	0	1	0	10
15	21	5.1	0	1	0	10
15	22	5.4	0	0	0	0
15	23	8.5	1	0	0	100
15	24	12.9	1	0	0	100
15	25	11.3	1	0	0	100
15	26	8.8	1	0	0	100
15	27	9	1	0	0	100
15	28	9.2	1	0	0	100
15	29	9.4	1	0	0	100
15	30	9.2	1	0	0	100
15	31	9.6	1	0	0	100
15	32	7	1	0	0	100
16	0	4.8	0	0	0	0
16	1	10.7	1	0	0	100
16	2	7.1	1	0	0	100
16	3	4.8	0	0	0	0
16	4	5.8	0	0	0	0
16	5	6.8	1	0	0	100
16	6	5.8	0	0	0	0
16	7	6.3	1	0	0	100
16	8	7.8	1	0	0	100
16	9	8.5	1	0	0	100
16	10	5.7	0	0	0	0
16	11	4.5	0	0	0	0
16	12	5.7	0	0	0	0
16	13	6.2	1	0	0	100
16	14	5.9	0	0	0	0
16	15	5	0	0	0	0
16	16	3.9	0	0	0	0
16	17	6.4	1	0	0	100
16	18	8.5	1	0	0	100
16	19	6.7	1	0	0	100
16	20	6.2	1	1	0	110
16	21	6	1	1	0	110
16	22	5.1	0	0	1	1
16	23	9.4	1	0	1	101

16	24	15	1	0	0	100
16	25	8.9	1	0	0	100
16	26	4.3	0	0	0	0
16	27	8	1	0	0	100
16	28	10.1	1	0	0	100
16	29	10	1	0	0	100
16	30	9	1	0	0	100
16	31	10.7	1	0	0	100
16	32	6.6	1	0	0	100
17	0	2.6	0	0	0	0
17	1	9.5	1	0	0	100
17	2	7.2	1	0	0	100
17	3	6.4	1	0	0	100
17	4	8.2	1	0	0	100
17	5	7.9	1	0	0	100
17	6	5.2	0	0	0	0
17	7	4.2	0	0	0	0
17	8	6.5	1	0	0	100
17	9	10.4	1	0	0	100
17	10	4.9	0	0	0	0
17	11	3.2	0	0	0	0
17	12	5.2	0	0	0	0
17	13	5.2	0	0	0	0
17	14	6	1	0	0	100
17	15	6.6	1	0	0	100
17	16	5.4	0	0	0	0
17	17	8.8	1	0	0	100
17	18	8.5	1	0	0	100
17	19	7.6	1	0	0	100
17	20	6.9	1	1	0	110
17	21	8.8	1	1	1	111
17	22	6.1	1	0	1	101
17	23	6.6	1	0	1	101
17	24	15.7	1	0	0	100
17	25	9.4	1	0	0	100
17	26	1.5	0	0	0	0
17	27	7.8	1	0	0	100
17	28	10.7	1	0	0	100
17	29	8.5	1	0	0	100
17	30	11.1	1	0	0	100
17	31	13.1	1	0	0	100
17	32	10.6	1	0	0	100
18	0	4.5	0	0	0	0
18	1	9.8	1	0	0	100
18	2	6.9	1	0	0	100
18	3	8.4	1	0	0	100
18	4	8.8	1	0	0	100
18	5	9.6	1	0	0	100
18	6	6.1	1	0	0	100
18	7	3.4	0	0	0	0
18	8	5.8	0	0	0	0
18	9	9.8	1	0	0	100
18	10	5.2	0	0	0	0
18	11	6.2	1	0	0	100
18	12	6.9	1	0	0	100
18	13	3.9	0	0	0	0
18	14	4.4	0	0	0	0
18	15	6.1	1	0	0	100
18	16	7.3	1	0	0	100
18	17	8.5	1	0	0	100
18	18	6.8	1	0	0	100
18	19	7.8	1	1	0	110
18	20	9.8	1	0	0	100
18	21	8.8	1	0	0	100
18	22	4.4	0	0	1	1
18	23	7.5	1	0	1	101
18	24	12.2	1	0	0	100
18	25	11.7	1	0	0	100
18	26	7	1	0	0	100
18	27	7.6	1	0	0	100
18	28	9	1	0	0	100
18	29	6.9	1	0	0	100
18	30	8.9	1	0	0	100
18	31	10.9	1	0	0	100

18	32	8.4	1	0	0	100
19	0	6.9	1	0	0	100
19	1	9.8	1	0	0	100
19	2	7.4	1	0	0	100
19	3	9	1	0	0	100
19	4	9.1	1	0	0	100
19	5	8.7	1	0	0	100
19	6	6.9	1	0	0	100
19	7	4.7	0	0	0	0
19	8	6	0	0	0	0
19	9	8	1	0	0	100
19	10	7	1	0	0	100
19	11	7.3	1	0	0	100
19	12	7.6	1	0	0	100
19	13	3.8	0	0	0	0
19	14	3	0	0	0	0
19	15	3.7	0	0	0	0
19	16	4.7	0	0	0	0
19	17	5.1	0	0	0	0
19	18	4.7	0	0	0	0
19	19	6.7	1	1	0	110
19	20	9	1	0	0	100
19	21	8.1	1	0	0	100
19	22	5.5	0	0	0	0
19	23	8.7	1	0	0	100
19	24	11.3	1	0	0	100
19	25	12.3	1	0	0	100
19	26	8.8	1	0	0	100
19	27	7.1	1	0	0	100
19	28	6.8	1	0	0	100
19	29	6.4	1	0	0	100
19	30	7.7	1	0	0	100
19	31	9	1	0	0	100
19	32	8	1	0	0	100
20	0	6.4	1	0	0	100
20	1	10	1	0	0	100
20	2	5.6	0	0	0	0
20	3	9	1	0	0	100
20	4	8.3	1	0	0	100
20	5	7.6	1	0	0	100
20	6	7.4	1	0	0	100
20	7	4.8	0	0	0	0
20	8	5.4	0	0	0	0
20	9	6.5	1	0	0	100
20	10	7.4	1	0	0	100
20	11	7.8	1	0	0	100
20	12	9.3	1	0	0	100
20	13	3.8	0	0	0	0
20	14	2.4	0	0	1	1
20	15	1.7	0	0	1	1
20	16	2.3	0	0	1	1
20	17	2.6	0	0	1	1
20	18	2.8	0	0	0	0
20	19	6.1	1	1	0	110
20	20	9.4	1	0	0	100
20	21	8.2	1	0	1	101
20	22	4.9	0	0	1	1
20	23	10	1	0	0	100
20	24	10.3	1	0	0	100
20	25	12.8	1	0	0	100
20	26	8.6	1	0	0	100
20	27	5.4	0	0	0	0
20	28	4.8	0	0	0	0
20	29	6.3	1	0	0	100
20	30	7.6	1	0	0	100
20	31	8.6	1	0	0	100
20	32	8.6	1	0	0	100
21	0	4.4	0	0	0	0
21	1	4.8	0	0	0	0
21	2	4.1	0	0	0	0
21	3	7.6	1	0	0	100
21	4	5.1	0	0	0	0
21	5	7.5	1	0	0	100
21	6	6.6	1	0	0	100

21	7	3.4	0	0	0	0
21	8	3.1	0	0	0	0
21	9	3.9	0	0	0	0
21	10	5	0	0	0	0
21	11	8.8	1	0	0	100
21	12	9	1	0	0	100
21	13	7.1	1	0	0	100
21	14	5.5	0	0	1	1
21	15	1.4	0	0	1	1
21	16	2.4	0	0	1	1
21	17	4	0	0	1	1
21	18	5.8	0	0	0	0
21	19	8.1	1	1	0	110
21	20	12.1	1	0	0	100
21	21	9.2	1	0	1	101
21	22	3.2	0	0	1	1
21	23	10.6	1	0	0	100
21	24	7.8	1	0	0	100
21	25	10.1	1	0	0	100
21	26	9.1	1	0	0	100
21	27	1.1	0	0	0	0
21	28	3.2	0	0	0	0
21	29	7.5	1	0	0	100
21	30	10.6	1	0	0	100
21	31	9.5	1	0	0	100
21	32	9.9	1	0	0	100
22	0	5.8	0	0	0	0
22	1	5	0	0	0	0
22	2	4.2	0	0	0	0
22	3	4.6	0	0	0	0
22	4	3.3	0	0	0	0
22	5	4.7	0	0	0	0
22	6	4.9	0	0	0	0
22	7	2.9	0	0	0	0
22	8	1.1	0	0	0	0
22	9	0.6	0	0	0	0
22	10	1.1	0	0	0	0
22	11	5.6	0	0	0	0
22	12	7.6	1	0	0	100
22	13	9.6	1	0	0	100
22	14	8.2	1	0	0	100
22	15	4.7	0	0	0	0
22	16	5.5	0	0	0	0
22	17	7.2	1	0	0	100
22	18	8	1	0	0	100
22	19	8.5	1	0	0	100
22	20	13.3	1	0	0	100
22	21	11.1	1	0	0	100
22	22	6	0	0	0	0
22	23	10.3	1	0	1	101
22	24	12.4	1	0	1	101
22	25	9.7	1	0	0	100
22	26	7.3	1	0	0	100
22	27	3.7	0	0	0	0
22	28	6.9	1	0	0	100
22	29	10.6	1	0	0	100
22	30	11.3	1	0	0	100
22	31	9.7	1	0	0	100
22	32	6.6	1	0	0	100
23	0	5	0	0	0	0
23	1	4.6	0	0	0	0
23	2	4.1	0	0	0	0
23	3	3.9	0	0	0	0
23	4	3.5	0	0	0	0
23	5	4.4	0	0	0	0
23	6	5.3	0	0	0	0
23	7	3.9	0	0	0	0
23	8	1.8	0	0	0	0
23	9	0.3	0	0	0	0
23	10	0	0	0	0	0
23	11	2	0	0	0	0
23	12	4.7	0	0	0	0
23	13	8.7	1	0	0	100
23	14	8.6	1	0	1	101

23	15	7.8	1	0	1	101
23	16	9.7	1	0	0	100
23	17	10.4	1	0	0	100
23	18	9.5	1	0	0	100
23	19	9.8	1	0	0	100
23	20	11	1	0	0	100
23	21	9.8	1	0	0	100
23	22	8.8	1	0	1	101
23	23	10.8	1	0	1	101
23	24	14.5	1	0	1	101
23	25	12.2	1	0	0	100
23	26	7.6	1	0	0	100
23	27	6.8	1	0	0	100
23	28	9.7	1	0	0	100
23	29	11.6	1	0	0	100
23	30	10.5	1	0	0	100
23	31	7.5	1	0	0	100
23	32	3.3	0	0	0	0
24	0	3	0	0	0	0
24	1	3.8	0	0	0	0
24	2	3.8	0	0	0	0
24	3	3.8	0	0	0	0
24	4	3.6	0	0	0	0
24	5	4.6	0	0	0	0
24	6	6.9	1	0	0	100
24	7	6.1	1	0	0	100
24	8	4	0	0	0	0
24	9	1.9	0	0	0	0
24	10	0.3	0	0	0	0
24	11	-0.3	0	0	0	0
24	12	1.7	0	0	0	0
24	13	8.3	1	0	1	101
24	14	8.3	1	0	1	101
24	15	9.6	1	1	1	111
24	16	14.1	1	0	0	100
24	17	12.9	1	0	0	100
24	18	10.4	1	0	0	100
24	19	11.3	1	0	0	100
24	20	9.3	1	0	0	100
24	21	8.2	1	0	0	100
24	22	9.8	1	0	1	101
24	23	9.1	1	0	1	101
24	24	15.4	1	0	1	101
24	25	13.8	1	0	0	100
24	26	7.4	1	0	0	100
24	27	9.4	1	0	0	100
24	28	12.1	1	0	0	100
24	29	12.2	1	0	0	100
24	30	9.4	1	0	0	100
24	31	5.9	0	0	0	0
24	32	2.9	0	0	0	0
25	0	1.6	0	0	0	0
25	1	2.3	0	0	0	0
25	2	2.8	0	0	0	0
25	3	3.1	0	0	0	0
25	4	2.6	0	0	0	0
25	5	3.7	0	0	0	0
25	6	6.7	1	0	0	100
25	7	8.3	1	0	0	100
25	8	7.3	1	0	0	100
25	9	6	1	0	0	100
25	10	2.6	0	0	0	0
25	11	0.4	0	0	0	0
25	12	2.3	0	0	0	0
25	13	6.7	1	0	1	101
25	14	7.6	1	0	1	101
25	15	11.1	1	0	1	101
25	16	20	1	0	0	100
25	17	9.5	1	0	0	100
25	18	12.7	1	0	0	100
25	19	15.9	1	0	0	100
25	20	9.1	1	0	0	100
25	21	9.9	1	0	0	100
25	22	8.4	1	0	0	100

25	25	8	1	0	0	100
25	26	10.9	1	0	0	100
25	27	14.4	1	0	0	100
25	28	12.4	1	0	0	100
25	29	11.1	1	0	0	100
25	30	8.2	1	0	0	100
25	31	6.8	1	0	0	100
25	32	9.1	1	0	0	100
26	0	5	0	0	0	0
26	1	3.7	0	0	0	0
26	2	4.3	0	0	0	0
26	3	4.7	0	0	0	0
26	4	4	0	0	0	0
26	5	4.4	0	0	0	0
26	6	7.3	1	0	0	100
26	7	8.9	1	0	0	100
26	8	8.6	1	0	0	100
26	9	8.6	1	0	0	100
26	10	6.3	1	0	0	100
26	11	2.8	0	0	0	0
26	12	2	0	0	1	1
26	13	4.5	0	0	1	1
26	14	6.5	1	0	0	100
26	15	11.5	1	0	0	100
26	16	16	1	0	0	100
26	17	7	1	0	0	100
26	18	10.9	1	0	0	100
26	19	13.5	1	0	0	100
26	20	9.9	1	0	0	100
26	25	6.2	1	0	0	100
26	26	11.3	1	0	0	100
26	27	12.5	1	0	0	100
26	28	12.6	1	0	0	100
26	29	14.8	1	0	0	100
26	30	14.3	1	0	0	100
26	31	13.1	1	0	0	100
26	32	13.8	1	0	0	100
27	0	6.4	1	0	0	100
27	1	6.8	1	0	0	100
27	2	6.8	1	0	0	100
27	3	6.4	1	0	0	100
27	4	6	0	0	0	0
27	5	6.2	1	0	0	100
27	6	7.6	1	0	0	100
27	7	8.9	1	0	0	100
27	8	9.8	1	0	0	100
27	9	9.2	1	1	0	110
27	10	8.3	1	1	0	110
27	11	5.4	0	0	0	0
27	12	3.2	0	0	1	1
27	13	3.3	0	0	1	1
27	14	5.3	0	0	0	0
27	15	10.7	1	1	0	110
27	16	13	1	0	0	100
27	17	8.6	1	0	0	100
27	18	10.8	1	0	0	100
28	0	7.5	1	0	0	100
28	1	10.7	1	0	0	100
28	2	9.6	1	0	0	100
28	3	7.4	1	0	0	100
28	4	6.8	1	0	0	100
28	5	6.8	1	0	0	100
28	6	7.1	1	0	0	100
28	7	8.4	1	0	0	100
28	8	10.5	1	0	0	100
28	9	8.8	1	0	0	100
28	10	9.9	1	0	0	100
28	11	7.5	1	0	0	100
28	12	4.8	0	0	0	0
28	13	3.4	0	0	0	0
28	14	4.3	0	0	0	0
28	15	11.4	1	1	0	110
28	16	13.5	1	0	0	100
28	17	8.2	1	0	0	100

28	18	11.8	1	0	0	100
29	0	9.1	1	0	0	100
29	1	17.3	1	0	0	100
29	2	13.1	1	0	0	100
29	3	5.4	0	0	0	0
29	4	3.9	0	0	0	0
29	5	4.6	0	0	0	0
29	6	4.9	0	0	0	0
29	7	7.7	1	0	0	100
29	8	10.1	1	0	0	100
29	9	8.6	1	0	0	100
29	10	9.1	1	0	0	100
29	11	8.4	1	0	0	100
29	12	8	1	1	0	110
29	13	6.6	1	1	0	110
29	14	6	0	0	0	0
29	15	13.1	1	1	0	110
29	16	16.6	1	0	0	100
29	17	5.4	0	0	0	0
29	18	12.5	1	0	0	100
30	0	10.2	1	0	0	100
30	1	8.8	1	0	0	100
30	2	10.3	1	0	0	100
30	3	7.8	1	0	0	100
30	4	7.2	1	0	0	100
30	5	7.3	1	0	0	100
30	6	6.2	1	0	0	100
30	7	4.9	0	0	0	0
30	8	8.2	1	0	0	100
30	9	8.3	1	0	0	100
30	10	10.8	1	0	0	100
30	11	8.7	1	0	0	100
30	12	7.1	1	1	0	110
30	13	6.4	1	1	0	110
30	14	6.6	1	0	0	100
30	15	8.3	1	1	0	110
30	16	11.8	1	1	0	110
30	17	2.6	0	0	0	0
30	18	12.1	1	0	0	100
31	0	6.1	1	0	0	100
31	1	7.2	1	0	0	100
31	2	9.1	1	0	0	100
31	3	8	1	0	0	100
31	4	6.9	1	0	0	100
31	5	7.7	1	0	0	100
31	6	8.3	1	0	0	100
31	7	5.4	0	0	0	0
31	8	5.1	0	0	0	0
31	9	6.8	1	0	0	100
31	10	8.7	1	0	0	100
31	11	7.5	1	0	0	100
31	12	6.2	1	1	0	110
31	13	5.7	0	1	0	10
31	14	4.7	0	1	0	10
31	15	4.8	0	1	0	10
31	16	9.4	1	0	0	100
31	17	4.6	0	0	0	0
31	18	11	1	0	0	100
31	28	6.1	1	1	0	110
31	29	1.3	0	1	0	10
32	0	6.1	1	0	0	100
32	1	7.9	1	0	0	100
32	2	8.1	1	0	0	100
32	3	6.5	1	0	0	100
32	4	4.7	0	0	0	0
32	5	6	0	0	0	0
32	6	8.1	1	0	0	100
32	7	7.4	1	0	0	100
32	8	4.7	0	0	0	0
32	9	4.6	0	0	0	0
32	10	6.4	1	0	0	100
32	11	7.5	1	0	0	100
32	12	7.1	1	1	0	110
32	13	6.8	1	1	0	110

32	14	5.4	0	0	0	0
32	15	3.7	0	1	0	10
32	16	6.9	1	1	0	110
32	17	6.8	1	0	0	100
32	18	8.3	1	0	0	100
32	27	5.9	0	0	0	0
32	28	4.3	0	1	0	10
32	29	1.1	0	1	0	10
32	30	0.1	0	1	0	10
32	31	0.6	0	1	0	10
32	32	1.4	0	0	0	0
33	0	5.9	0	0	0	0
33	1	8.6	1	0	0	100
33	2	7.9	1	0	0	100
33	3	5.4	0	0	0	0
33	4	2.2	0	0	0	0
33	5	4	0	0	0	0
33	6	8.1	1	0	0	100
33	7	9.5	1	0	0	100
33	8	3.6	0	0	0	0
33	9	2.2	0	0	0	0
33	10	4.2	0	0	0	0
33	11	7.6	1	0	0	100
33	12	7.6	1	0	0	100
33	13	8.6	1	0	0	100
33	14	7.5	1	0	0	100
33	15	1.8	0	1	0	10
33	16	5.3	0	0	0	0
33	17	7	1	0	0	100
33	18	6	0	0	0	0
33	27	3.9	0	0	0	0
33	28	2.8	0	1	0	10
33	29	0.3	0	1	0	10
33	30	0.2	0	1	0	10
33	31	1.5	0	1	0	10
33	32	3.2	0	0	0	0
34	0	2.6	0	0	0	0
34	1	5.2	0	0	0	0
34	2	8.3	1	0	0	100
34	3	7	1	0	0	100
34	4	3.7	0	0	0	0
34	5	4.4	0	0	0	0
34	6	8.2	1	0	0	100
34	7	7.5	1	0	0	100
34	8	2.4	0	0	0	0
34	9	0.3	0	0	0	0
34	10	2.2	0	0	0	0
34	11	5	0	0	0	0
34	12	5.7	0	0	0	0
34	13	9.4	1	1	0	110
34	14	10.6	1	0	0	100
34	15	1.4	0	0	0	0
34	16	2.2	0	0	0	0
34	17	3.1	0	0	0	0
34	18	2.5	0	0	0	0
34	27	0.4	0	0	0	0
34	28	0.3	0	1	0	10
34	29	0	0	1	0	10
34	30	0.3	0	1	0	10
34	31	2.5	0	1	0	10
34	32	5.4	0	0	0	0
35	0	1.4	0	0	0	0
35	1	3.8	0	0	0	0
35	2	6.3	1	0	0	100
35	3	6.5	1	0	0	100
35	4	4.8	0	0	0	0
35	5	5.1	0	0	0	0
35	6	8	1	0	0	100
35	7	7	1	0	0	100
35	8	2.6	0	0	0	0
35	9	0.2	0	0	0	0
35	10	0.4	0	0	0	0
35	11	1.9	0	0	0	0
35	12	5.5	0	0	0	0

35	13	8.7	1	0	0	100
35	14	7.4	1	0	0	100
35	15	1.6	0	1	0	10
35	16	0.5	0	0	0	0
35	17	0.7	0	0	0	0
35	18	0.6	0	0	0	0
35	19	0.6	0	0	0	0
35	20	2	0	1	0	10
35	21	4.7	0	1	0	10
35	27	-0.1	0	0	0	0
35	28	0	0	0	0	0
35	29	0	0	0	0	0
35	30	0.3	0	0	0	0
35	31	2.5	0	0	0	0
35	32	6.4	1	0	0	100
36	0	1.9	0	0	0	0
36	1	3.8	0	0	0	0
36	2	5.3	0	0	0	0
36	3	5.5	0	0	0	0
36	4	4.5	0	0	0	0
36	5	4.6	0	0	0	0
36	6	6.9	1	0	0	100
36	7	7.3	1	0	0	100
36	8	4.6	0	0	0	0
36	9	2	0	0	0	0
36	10	0.7	0	0	0	0
36	11	1.6	0	0	0	0
36	12	6.5	1	0	0	100
36	13	8.9	1	0	0	100
36	14	6.6	1	0	0	100
36	15	2.1	0	0	0	0
36	16	0.4	0	0	0	0
36	17	0.1	0	0	0	0
36	18	0.1	0	0	0	0
36	19	0.6	0	1	0	10
36	20	2.3	0	1	1	11
36	21	4.4	0	1	1	11
36	27	-0.2	0	0	0	0
36	28	-0.2	0	0	0	0
36	29	-0.1	0	0	0	0
36	30	0.4	0	1	0	10
36	31	2.3	0	0	0	0
36	32	5.5	0	1	0	10
37	0	3.8	0	0	0	0
37	1	4.6	0	0	0	0
37	2	5.1	0	1	0	10
37	3	5	0	1	0	10
37	4	4.1	0	0	0	0
37	5	3.4	0	0	0	0
37	6	5.7	0	0	0	0
37	7	8.1	1	0	0	100
37	8	6.6	1	0	0	100
37	9	4.3	0	1	0	10
37	10	1.7	0	1	0	10
37	11	0.9	0	0	0	0
37	12	8	1	1	0	110
37	13	10.1	1	0	0	100
37	14	7.1	1	0	0	100
37	15	2.4	0	0	0	0
37	16	0.6	0	1	0	10
37	17	0.1	0	1	0	10
37	18	0.1	0	0	0	0
37	19	0.4	0	1	0	10
37	20	2.3	0	1	1	11
37	21	4.1	0	0	1	1
37	22	4.6	0	0	1	1
37	23	5.2	0	0	0	0
37	24	4.8	0	0	0	0
37	25	3.5	0	0	0	0
37	26	1.6	0	0	0	0
37	27	0	0	0	0	0
37	28	-0.1	0	0	0	0
37	29	0	0	1	0	10
37	30	0.2	0	1	0	10

37	31	1.5	0	0	0	0
37	32	3.9	0	1	0	10
38	0	6.6	1	0	0	100
38	1	5.9	0	0	0	0
38	2	4.9	0	0	0	0
38	3	4.7	0	1	0	10
38	4	6	0	0	0	0
38	5	4.9	0	0	0	0
38	6	2.9	0	0	0	0
38	7	5.7	0	0	0	0
38	8	7.2	1	0	0	100
38	9	6.5	1	0	0	100
38	10	3.8	0	1	0	10
38	11	0.7	0	1	0	10
38	12	5.6	0	1	0	10
38	13	8.2	1	0	0	100
38	14	9	1	1	0	110
38	15	3.2	0	0	0	0
38	16	0.8	0	0	0	0
38	17	0	0	1	0	10
38	18	0.2	0	1	0	10
38	19	0.2	0	1	0	10
38	20	1.5	0	0	0	0
38	21	2.9	0	0	0	0
38	22	4.2	0	0	0	0
38	23	6.2	1	0	0	100
38	24	7.8	1	0	0	100
38	25	6.6	1	0	0	100
38	26	3.6	0	0	0	0
38	27	-0.1	0	0	0	0
38	28	-0.1	0	0	0	0
38	29	0	0	1	0	10
38	30	0	0	1	0	10
38	31	0.3	0	0	0	0
38	32	2.3	0	1	0	10
39	0	4.3	0	0	0	0
39	1	3.9	0	0	0	0
39	2	3.5	0	1	0	10
39	3	3.4	0	1	0	10
39	4	6.1	1	1	0	110
39	5	5.5	0	0	0	0
39	6	5.3	0	0	0	0
39	7	4.2	0	0	0	0
39	8	5.6	0	1	0	10
39	9	8.2	1	0	0	100
39	10	7	1	1	0	110
39	11	6.2	1	0	0	100
39	12	7.3	1	0	0	100
39	13	8.2	1	0	0	100
39	14	7.4	1	1	0	110
39	15	2.7	0	0	0	0
39	16	0.5	0	0	0	0
39	17	-0.1	0	1	0	10
39	18	-0.1	0	0	0	0
39	19	0.2	0	0	0	0
39	20	2.9	0	0	0	0
39	21	5.4	0	0	0	0
39	22	8.6	1	0	0	100
39	23	10.3	1	0	0	100
39	24	12.1	1	0	0	100
39	25	11.5	1	0	0	100
39	26	6.4	1	0	0	100
39	27	2.1	0	0	0	0
39	28	-0.1	0	0	0	0
39	29	-0.1	0	1	0	10
39	30	0	0	1	0	10
39	31	0	0	0	0	0
39	32	0.3	0	1	0	10
40	0	2.1	0	0	0	0
40	1	2.4	0	0	0	0
40	2	2.1	0	1	0	10
40	3	2.6	0	0	0	0
40	4	5.3	0	1	0	10
40	5	5.8	0	0	0	0

40	6	5.5	0	0	0	0
40	7	3.3	0	1	0	10
40	8	4.2	0	1	0	10
40	9	6.9	1	0	0	100
40	10	8.4	1	1	0	110
40	11	8.3	1	0	0	100
40	12	9.1	1	0	0	100
40	13	10.1	1	1	0	110
40	14	8.7	1	1	0	110
40	15	5	0	0	0	0
40	16	1.5	0	0	0	0
40	17	-0.2	0	0	0	0
40	18	0.3	0	0	0	0
40	19	3.5	0	0	0	0
40	20	7.9	1	0	0	100
40	21	11.5	1	0	0	100
40	22	14.9	1	0	0	100
40	23	15.6	1	0	0	100
40	24	16.1	1	0	0	100
40	25	14.6	1	0	0	100
40	26	9.6	1	0	0	100
40	27	4.1	0	0	0	0
40	28	0.5	0	0	0	0
40	29	-0.2	0	0	0	0
40	30	-0.1	0	1	0	10
40	31	-0.1	0	0	0	0
40	32	0.1	0	1	0	10
41	0	1.1	0	0	0	0
41	1	1.6	0	0	0	0
41	2	1	0	0	0	0
41	3	1.1	0	0	0	0
41	4	4.6	0	0	0	0
41	5	5.5	0	0	0	0
41	6	5.5	0	0	0	0
41	7	1.4	0	1	0	10
41	8	2.2	0	0	0	0
41	9	5.6	0	1	0	10
41	10	8.9	1	1	0	110
41	11	8.3	1	0	0	100
41	12	9.3	1	0	0	100
41	13	11.9	1	1	0	110
41	14	10.4	1	1	0	110
41	15	7.9	1	0	0	100
41	16	3.3	0	0	0	0
41	17	0.2	0	0	0	0
41	18	0.9	0	0	0	0
41	19	7.6	1	0	0	100
41	20	14.4	1	0	0	100
41	21	18.3	1	0	0	100
41	22	21.2	1	0	0	100
41	23	19.7	1	0	0	100
41	24	19.8	1	0	0	100
41	25	17.3	1	0	0	100
41	26	11.7	1	0	0	100
41	27	5.1	0	0	0	0
41	28	0.5	0	0	0	0
41	29	-0.2	0	0	0	0
41	30	-0.1	0	0	0	0
41	31	0	0	0	0	0
41	32	0.5	0	0	0	0
42	0	2	0	0	0	0
42	1	1.6	0	0	0	0
42	2	1.2	0	0	0	0
42	3	0.3	0	0	0	0
42	4	3	0	0	0	0
42	5	4.3	0	0	0	0
42	6	3.8	0	1	0	10
42	7	0.5	0	1	0	10
42	8	1.8	0	0	0	0
42	9	6.1	1	0	0	100
42	10	8.2	1	1	0	110
42	11	6.9	1	0	0	100
42	12	7	1	0	0	100
42	13	9.9	1	0	0	100

42	14	8.5	1	1	0	110
42	15	10.5	1	1	0	110
42	16	7.1	1	0	0	100
42	17	1.1	0	0	0	0
42	18	2	0	0	0	0
42	19	10.8	1	0	0	100
42	20	20.4	1	0	0	100
42	21	25.2	1	0	0	100
42	22	23	1	0	0	100
42	23	19.3	1	0	0	100
42	24	25.5	1	0	0	100
42	25	17.2	1	0	0	100
42	26	10.1	1	0	0	100
42	27	5.7	0	0	0	0
42	28	0.6	0	0	0	0
42	29	-0.1	0	0	0	0
42	30	0	0	0	0	0
42	31	0	0	0	0	0
42	32	0.5	0	0	0	0
43	0	6.4	1	0	0	100
43	1	3.4	0	0	0	0
43	2	2	0	0	0	0
43	3	0.7	0	0	0	0
43	4	0.7	0	0	0	0
43	5	1	0	0	0	0
43	6	0.8	0	1	0	10
43	7	-0.1	0	0	0	0
43	8	2.6	0	1	0	10
43	9	8.5	1	0	0	100
43	10	7.1	1	1	0	110
43	11	7.4	1	1	0	110
43	12	6.7	1	0	0	100
43	13	6.3	1	0	0	100
43	14	5.6	0	0	0	0
43	15	9.5	1	0	0	100
43	16	9.9	1	0	0	100
43	17	4	0	0	0	0
43	18	3.3	0	0	0	0
43	19	11.5	1	0	0	100
43	20	22.4	1	0	0	100
43	21	28.8	1	0	0	100
43	22	12.6	1	0	0	100
43	23	24.6	1	0	0	100
43	24	32.3	1	0	0	100
43	25	21.4	1	0	0	100
43	26	10.3	1	0	0	100
43	27	5.4	0	0	0	0
43	28	1.8	0	0	0	0
43	29	0.3	0	0	0	0
43	30	-0.1	0	0	0	0
43	31	0	0	0	0	0
43	32	1.4	0	0	0	0
44	0	8.1	1	0	0	100
44	1	4.5	0	0	0	0
44	2	2.6	0	0	0	0
44	3	0.8	0	0	0	0
44	4	0.1	0	0	0	0
44	5	-0.1	0	0	0	0
44	6	-0.1	0	0	0	0
44	7	0.3	0	1	0	10
44	8	3.6	0	0	0	0
44	9	8.2	1	0	0	100
44	10	6.8	1	0	0	100
44	11	5.4	0	1	0	10
44	12	4.5	0	1	0	10
44	13	4.3	0	0	0	0
44	14	5.5	0	0	0	0
44	15	8.5	1	0	0	100
44	16	10.5	1	0	0	100
44	17	7.4	1	0	0	100
44	18	6.4	1	0	0	100
44	19	11.6	1	0	0	100
44	20	19.5	1	0	0	100
44	21	24.1	1	0	0	100

44	22	18.9	1	0	0	100
44	23	24.1	1	0	0	100
44	24	26.4	1	0	0	100
44	25	17.9	1	0	0	100
44	26	9.4	1	0	0	100
44	27	5.7	0	0	0	0
44	28	2.8	0	0	0	0
44	29	0.6	0	0	0	0
44	30	-0.2	0	0	0	0
44	31	0	0	0	0	0
44	32	1.5	0	0	0	0
45	0	8.2	1	0	0	100
45	1	5.4	0	0	0	0
45	2	3.8	0	0	0	0
45	3	1.4	0	0	0	0
45	4	0.2	0	0	0	0
45	5	0	0	0	0	0
45	6	0.7	0	0	0	0
45	7	1	0	0	0	0
45	8	4.2	0	1	0	10
45	9	9.3	1	0	0	100
45	10	7	1	0	0	100
45	11	4.4	0	1	0	10
45	12	3.7	0	1	0	10
45	13	4.1	0	0	0	0
45	14	6.4	1	0	0	100
45	15	8.1	1	0	0	100
45	16	12.3	1	0	0	100
45	17	10	1	0	0	100
45	18	7.7	1	0	0	100
45	19	10.3	1	0	0	100
45	20	15.6	1	0	0	100
45	21	20	1	0	0	100
45	22	20.4	1	0	0	100
45	23	21.4	1	0	0	100
45	24	19.8	1	0	0	100
45	25	11.5	1	0	0	100
45	26	6.5	1	0	0	100
45	27	6.2	1	0	0	100
45	28	3.7	0	0	0	0
45	29	0.7	0	0	0	0
45	30	-0.2	0	0	0	0
45	31	0	0	0	0	0
45	32	2.3	0	0	0	0
46	0	6.4	1	0	0	100
46	1	9.3	1	0	0	100
46	2	6.2	1	0	0	100
46	3	2.4	0	0	0	0
46	4	0.4	0	0	0	0
46	5	0.3	0	0	0	0
46	6	3.3	0	0	0	0
46	7	4.3	0	0	0	0
46	8	3.3	0	0	0	0
46	9	9.2	1	0	0	100
46	10	9	1	0	0	100
46	11	8.6	1	1	0	110
46	12	8.2	1	0	0	100
46	13	7.2	1	0	0	100
46	14	9.9	1	0	0	100
46	15	7.5	1	0	0	100
46	16	12.6	1	0	0	100
46	17	11.4	1	0	1	101
46	18	9.2	1	0	1	101
46	19	9.3	1	0	0	100
46	20	12.2	1	0	0	100
46	21	13.3	1	0	0	100
46	22	14.2	1	0	0	100
46	23	15.7	1	0	0	100
46	24	13	1	0	0	100
46	25	7.9	1	0	0	100
46	26	6.7	1	0	0	100
46	27	7.1	1	0	0	100
46	28	3.8	0	0	0	0
46	29	0.6	0	0	0	0

46	30	0.2	0	0	0	0
46	31	1.3	0	0	0	0
46	32	4	0	0	0	0
47	0	5	0	1	0	10
47	1	8.4	1	0	0	100
47	2	7.5	1	0	0	100
47	3	3.4	0	0	0	0
47	4	1.6	0	0	0	0
47	5	2.2	0	0	0	0
47	6	5.2	0	0	0	0
47	7	6.6	1	0	0	100
47	8	6.8	1	0	0	100
47	9	9.4	1	0	0	100
47	10	13.6	1	0	0	100
47	11	18	1	0	0	100
47	12	9.8	1	0	0	100
47	13	10.3	1	0	0	100
47	14	10.5	1	0	0	100
47	15	6.2	1	0	0	100
47	16	10.5	1	0	0	100
47	17	11.6	1	0	1	101
47	18	12.3	1	0	1	101
47	19	11.5	1	0	0	100
47	20	11	1	0	0	100
47	21	7.5	1	0	0	100
47	22	6	1	0	0	100
47	23	8.6	1	0	0	100
47	24	7.2	1	0	0	100
47	25	6.8	1	0	0	100
47	26	7.7	1	0	0	100
47	27	6.8	1	0	0	100
47	28	3.5	0	0	0	0
47	29	2.1	0	0	0	0
47	30	1.9	0	0	0	0
47	31	3.9	0	0	0	0
47	32	7.4	1	0	0	100
48	0	7.6	1	0	0	100
48	1	8.2	1	0	0	100
48	2	6.3	1	0	0	100
48	3	3.3	0	0	0	0
48	4	3.4	0	0	0	0
48	5	4.4	0	0	0	0
48	6	6.1	1	0	0	100
48	7	8.2	1	0	0	100
48	8	9.4	1	0	0	100
48	9	13.7	1	0	0	100
48	10	16.2	1	0	0	100
48	11	15.3	1	0	0	100
48	12	9.5	1	0	0	100
48	13	10.4	1	0	0	100
48	14	9.5	1	0	0	100
48	15	9.3	1	0	0	100
48	16	8.5	1	0	0	100
48	17	10.9	1	0	1	101
48	18	13.9	1	0	1	101
48	19	16.3	1	0	0	100
48	20	15	1	0	0	100
48	21	11.3	1	0	0	100
48	22	6.7	1	0	0	100
48	23	6.4	1	0	0	100
48	24	4.5	0	0	0	0
48	25	4.1	0	0	0	0
48	26	5.7	0	0	0	0
48	27	6.4	1	0	0	100
48	28	5.6	0	0	0	0
48	29	5.2	0	0	0	0
48	30	5.5	0	0	0	0
48	31	9	1	0	0	100
48	32	12.3	1	0	0	100
49	0	13.1	1	0	0	100
49	1	8.7	1	0	0	100
49	2	5.3	0	0	0	0
49	3	3	0	0	0	0
49	4	4.7	0	0	0	0

49	5	6	1	0	0	100
49	6	7.4	1	0	0	100
49	7	9.6	1	0	0	100
49	8	10.6	1	0	0	100
49	9	11.2	1	0	0	100
49	10	11.1	1	0	0	100
49	11	9.4	1	0	0	100
49	12	6.9	1	0	0	100
49	13	8.1	1	0	0	100
49	14	8.5	1	0	0	100
49	15	7.4	1	0	0	100
49	16	5.5	0	0	0	0
49	17	7	1	0	1	101
49	18	10.6	1	0	1	101
49	19	14.1	1	0	0	100
49	20	13.7	1	0	0	100
49	21	11.8	1	0	0	100
49	22	9	1	0	0	100
49	23	7.3	1	0	0	100
49	24	5.1	0	0	0	0
49	25	3.7	0	0	0	0
49	26	4.1	0	0	0	0
49	27	5.5	0	0	0	0
49	28	6.1	1	0	0	100
49	29	6.4	1	0	0	100
49	30	8.4	1	0	0	100
49	31	11.7	1	0	0	100
49	32	14.2	1	0	0	100
50	0	16.6	1	0	0	100
50	1	9.8	1	0	0	100
50	2	5.6	0	0	0	0
50	3	2.9	0	0	0	0
50	4	7	1	0	0	100
50	5	8.1	1	0	0	100
50	6	8.6	1	0	0	100
50	7	10.7	1	0	0	100
50	8	10.3	1	0	0	100
50	9	6.8	1	0	0	100
50	10	4.7	0	0	0	0
50	11	3.1	0	0	0	0
50	12	2.4	0	0	0	0
50	13	4.9	0	0	0	0
50	14	6.5	1	0	0	100
50	15	4.9	0	0	0	0
50	16	2.2	0	0	0	0
50	17	3.4	0	0	0	0
50	18	6.6	1	0	0	100
50	19	10.6	1	1	0	110
50	20	9.8	1	1	0	110
50	21	10.6	1	0	0	100
50	22	9.9	1	0	0	100
50	23	8.4	1	0	0	100
50	24	6.6	1	0	0	100
50	25	4	0	0	0	0
50	26	2.7	0	0	0	0
50	27	4.5	0	0	0	0
50	28	5.5	0	0	0	0
50	29	5.5	0	0	0	0
50	30	9.3	1	0	0	100
50	31	12.6	1	0	0	100
50	32	12	1	0	0	100
51	0	12	1	0	0	100
51	1	13.6	1	0	0	100
51	2	9.9	1	1	0	110
51	3	6.7	1	0	0	100
51	4	8.4	1	0	0	100
51	5	11.8	1	0	0	100
51	6	11.8	1	0	0	100
51	7	10.3	1	0	0	100
51	8	7.7	1	0	0	100
51	9	4.1	0	0	0	0
51	10	1.4	0	0	0	0
51	11	0.2	0	0	0	0
51	12	0	0	0	0	0

51	13	0.4	0	0	0	0
51	14	0.8	0	0	0	0
51	15	3.1	0	0	0	0
51	16	4.8	0	0	0	0
51	17	6.4	1	0	0	100
51	18	7.6	1	0	0	100
51	19	6.5	1	1	1	111
51	20	4.4	0	1	1	11
51	21	7.3	1	0	1	101
51	22	8.1	1	0	0	100
51	23	5.9	0	0	0	0
51	24	8.2	1	0	0	100
51	25	7.2	1	0	0	100
51	26	1.2	0	0	0	0
51	27	3.2	0	0	0	0
51	28	2.8	0	0	0	0
51	29	2.9	0	0	0	0
51	30	8.2	1	0	0	100
51	31	10.7	1	0	0	100
51	32	6.7	1	0	0	100
52	0	8.7	1	1	0	110
52	1	14.3	1	1	1	111
52	2	13.3	1	1	0	110
52	3	11.8	1	0	0	100
52	4	11	1	0	0	100
52	5	12.6	1	0	0	100
52	6	10.5	1	0	0	100
52	7	8	1	0	0	100
52	8	5.2	0	0	0	0
52	9	2.6	0	0	0	0
52	10	0.6	0	0	0	0
52	11	-0.2	0	0	0	0
52	12	1.6	0	0	0	0
52	13	2.8	0	0	0	0
52	14	4.7	0	0	0	0
52	15	6.8	1	0	0	100
52	16	7.7	1	0	0	100
52	17	7.9	1	0	0	100
52	18	7.4	1	0	0	100
52	19	5.7	0	0	1	1
52	20	6.7	1	0	1	101
52	21	9.2	1	0	1	101
52	22	10.1	1	0	0	100
52	23	10.6	1	0	0	100
52	24	8.9	1	0	0	100
52	25	5	0	0	0	0
52	26	1.8	0	0	0	0
52	27	4.6	0	0	0	0
52	28	4.9	0	0	0	0
52	29	6.1	1	0	0	100
52	30	9.4	1	0	0	100
52	31	10.4	1	0	0	100
52	32	9.5	1	0	0	100
53	0	11.4	1	0	0	100
53	1	14.5	1	0	1	101
53	2	13.8	1	0	1	101
53	3	12.3	1	0	1	101
53	4	11.3	1	0	1	101
53	5	11.1	1	0	0	100
53	6	9.8	1	0	0	100
53	7	6.5	1	0	0	100
53	8	4	0	0	0	0
53	9	2.1	0	0	0	0
53	10	0.9	0	0	0	0
53	11	2	0	0	0	0
53	12	4.2	0	0	0	0
53	13	6.3	1	0	0	100
53	14	8.8	1	0	0	100
53	15	11	1	0	0	100
53	16	11.5	1	0	0	100
53	17	10.5	1	0	1	101
53	18	8.9	1	0	1	101
53	19	8.5	1	1	0	110
53	20	10.8	1	0	0	100

53	21	13.7	1	0	0	100
53	22	15.7	1	0	0	100
53	23	16	1	0	0	100
53	24	12.5	1	0	0	100
53	25	7.8	1	0	0	100
53	26	3.9	0	0	0	0
53	27	5.2	0	0	0	0
53	28	6.5	1	0	0	100
53	29	6.8	1	0	0	100
53	30	9.4	1	0	0	100
53	31	10.3	1	0	0	100
53	32	10.5	1	0	0	100
54	0	16	1	0	0	100
54	1	16.4	1	0	1	101
54	2	13	1	0	1	101
54	3	10.5	1	0	1	101
54	4	10.1	1	0	1	101
54	5	8.6	1	0	0	100
54	6	10.9	1	0	0	100
54	7	4.3	0	0	0	0
54	8	3	0	0	0	0
54	9	1.6	0	0	0	0
54	10	0.3	0	0	0	0
54	11	4.6	0	0	0	0
54	12	7.8	1	0	0	100
54	13	10.1	1	0	0	100
54	14	13.4	1	0	0	100
54	15	16.8	1	0	0	100
54	16	16.7	1	0	0	100
54	17	14.1	1	0	1	101
54	18	10.2	1	0	1	101
54	19	10.7	1	1	0	110
54	20	15.8	1	0	0	100
54	21	19.9	1	0	0	100
54	22	24.1	1	0	0	100
54	23	25.4	1	0	0	100
54	24	18.1	1	0	0	100
54	25	12.2	1	0	0	100
54	26	2.9	0	0	0	0
54	27	5.7	0	0	0	0
54	28	8.9	1	0	0	100
54	29	4.9	0	0	0	0
54	30	9.8	1	0	0	100
54	31	10.2	1	0	0	100
54	32	10.4	1	0	0	100

APPENDIX B. Listing of Selected Survey Quadrats in the Study Universe (n=151)

Listing of Selected Survey Quadrats in Study Universe (n=151; sorted by Quadrat No.)

Quadrat No.	% Grade	Slope	Toolstone	Water	Combined Score
		0 <=6%	0-has no ts.	0-water>560m	(slope,ts,water)
		1 >6%	1-has ts.	1-water<560m	
N3E1	4.5	0	0	0	0
N8E3	9.9	1	0	0	100
N8E5	5.5	0	0	0	0
N8E10	3.6	0	0	0	0
N8E16	0.8	0	0	0	0
N9E3	8.1	1	0	0	100
N10E16	0.7	0	0	0	0
N10E17	0.2	0	0	1	1
N11E23	3	0	0	0	0
N12E19	2.7	0	0	0	0
N13E13	3.1	0	0	0	0
N13E15	3.4	0	0	0	0
N13E16	4	0	0	0	0
N13E25	10	1	0	0	100
N14E10	6.5	1	0	0	100
N14E16	2.8	0	0	0	0
N14E18	3.1	0	0	0	0
N14E24	11.6	1	0	0	100
N15E1	7.8	1	0	0	100
N15E11	5.9	0	0	0	0
N15E16	3.1	0	0	0	0
N15E22	5.4	0	0	0	0
N16E4	5.8	0	0	0	0
N16E7	6.3	1	0	0	100
N16E8	7.8	1	0	0	100
N16E19	6.7	1	0	0	100
N16E26	4.3	0	0	0	0
N16E27	8	1	0	0	100
N16E31	10.7	1	0	0	100
N17E6	5.2	0	0	0	0
N17E9	10.4	1	0	0	100
N17E10	4.9	0	0	0	0
N17E16	5.4	0	0	0	0
N17E21	8.8	1	1	1	111
N17E24	15.7	1	0	0	100
N18E6	6.1	1	0	0	100
N18E28	9	1	0	0	100
N18E30	8.9	1	0	0	100
N20E5	7.6	1	0	0	100
N20E9	6.5	1	0	0	100
N20E17	2.6	0	0	1	1
N21E30	10.6	1	0	0	100
N22E2	4.2	0	0	0	0
N22E3	4.6	0	0	0	0
N22E12	7.6	1	0	0	100
N23E11	2	0	0	0	0
N23E24	14.5	1	0	1	101
N23E25	12.2	1	0	0	100
N24E4	3.6	0	0	0	0
N24E7	6.1	1	0	0	100
N24E15	9.6	1	1	1	111
N24E20	9.3	1	0	0	100
N24E32	2.9	0	0	0	0
N25E0	1.6	0	0	0	0
N25E2	2.8	0	0	0	0
N25E5	3.7	0	0	0	0
N25E15	11.1	1	0	1	101
N26E8	8.6	1	0	0	100
N26E12	2	0	0	1	1
N27E16	13	1	0	0	100
N29E4	3.9	0	0	0	0
N29E8	10.1	1	0	0	100
N29E15	13.1	1	1	0	110
N31E17	4.6	0	0	0	0
N31E29	1.3	0	1	0	10
N32E1	7.9	1	0	0	100
N33E9	2.2	0	0	0	0
N33E17	7	1	0	0	100
N34E0	2.6	0	0	0	0

N34E1	5.2	0	0	0	0
N34E4	3.7	0	0	0	0
N34E11	5	0	0	0	0
N35E8	2.6	0	0	0	0
N35E10	0.4	0	0	0	0
N35E13	8.7	1	0	0	100
N35E15	1.6	0	1	0	10
N35E29	0	0	0	0	0
N35E32	6.4	1	0	0	100
N36E2	5.3	0	0	0	0
N36E12	6.5	1	0	0	100
N36E20	2.3	0	1	1	11
N36E21	4.4	0	1	1	11
N36E29	-0.1	0	0	0	0
N37E12	8	1	1	0	110
N37E18	0.1	0	0	0	0
N37E19	0.4	0	1	0	10
N37E20	2.3	0	1	1	11
N37E31	1.5	0	0	0	0
N37E32	3.9	0	1	0	10
N38E1	5.9	0	0	0	0
N38E14	9	1	1	0	110
N38E19	0.2	0	1	0	10
N38E23	6.2	1	0	0	100
N38E29	0	0	1	0	10
N39E7	4.2	0	0	0	0
N39E14	7.4	1	1	0	110
N39E23	10.3	1	0	0	100
N39E26	6.4	1	0	0	100
N39E28	-0.1	0	0	0	0
N41E5	5.5	0	0	0	0
N41E12	9.3	1	0	0	100
N41E19	7.6	1	0	0	100
N42E12	7	1	0	0	100
N43E22	12.6	1	0	0	100
N43E25	21.4	1	0	0	100
N43E28	1.8	0	0	0	0
N44E10	6.8	1	0	0	100
N44E13	4.3	0	0	0	0
N45E12	3.7	0	1	0	10
N45E13	4.1	0	0	0	0
N45E14	6.4	1	0	0	100
N46E0	6.4	1	0	0	100
N46E2	6.2	1	0	0	100
N46E4	0.4	0	0	0	0
N46E13	7.2	1	0	0	100
N46E22	14.2	1	0	0	100
N47E1	8.4	1	0	0	100
N47E5	2.2	0	0	0	0
N47E11	18	1	0	0	100
N47E18	12.3	1	0	1	101
N47E19	11.5	1	0	0	100
N47E26	7.7	1	0	0	100
N48E0	7.6	1	0	0	100
N48E2	6.3	1	0	0	100
N48E5	4.4	0	0	0	0
N48E8	9.4	1	0	0	100
N48E12	9.5	1	0	0	100
N48E23	6.4	1	0	0	100
N48E31	9	1	0	0	100
N48E32	12.3	1	0	0	100
N49E4	4.7	0	0	0	0
N49E11	9.4	1	0	0	100
N50E9	6.8	1	0	0	100
N50E11	3.1	0	0	0	0
N50E18	6.6	1	0	0	100
N51E7	10.3	1	0	0	100
N51E17	6.4	1	0	0	100
N51E19	6.5	1	1	1	111
N51E20	4.4	0	1	1	11
N51E22	8.1	1	0	0	100
N51E23	5.9	0	0	0	0
N51E24	8.2	1	0	0	100
N52E1	14.3	1	1	1	111

N52E4	11	1	0	0	100
N52E31	10.4	1	0	0	100
N53E2	13.8	1	0	1	101
N53E5	11.1	1	0	0	100
N53E12	4.2	0	0	0	0
N53E19	8.5	1	1	0	110
N54E26	2.9	0	0	0	0
N54E28	8.9	1	0	0	100

APPENDIX C. Attributes of Projectile Points Observed During Survey

Key:

Condition	1 = Incomplete
	2 = Complete

If Unit_No blank, item not on transect

id	unit_no	specimen	style	material	condition	lt	la	lm	wm	wb	neck_width	thickness	weight	dsa	psa	noi	la_lt	lt_wm	wb_wm	lm_lt
N24E15		14	NOTTYPABL	OBSIDIAN	2	21.3	21.3	0.0	8.1	1.8	0.0	3.0	0.0	0	0	0	1.00	2.62	0.22	0.00
N24E15		15	OUTOFKEY	OPALITE	1	32.4	0.0	9.2	23.2	10.0	12.2	5.0	0.0	185	107	78	0.00	3.52	0.43	0.00
N24E15		17	HUMBOLDT	OPALITE	1	45.9	44.5	0.0	23.5	8.4	0.0	6.0	0.0	0	0	0	0.97	1.95	0.36	0.00
N38E29		25	GATECLIFF	OPALITE	1	40.1	39.0	5.1	23.4	10.3	9.3	9.0	0.0	160	97	63	0.97	1.71	0.44	0.13
N38E29		27	LSN	OPALITE	1	31.2	31.2	0.0	17.8	12.9	9.1	7.0	0.0	232	141	91	1.00	1.75	0.73	0.00
N35E8		31	NOTTYPABL	OPALITE	1	39.2	0.0	0.0	22.1	0.0	0.0	5.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N35E8		32	STEMMED	OPALITE	2	61.8	61.8	26.7	27.3	15.9	17.8	6.0	9.9	0	0	0	1.00	2.26	0.58	0.43
KC-4		43	NOTTYPABL	OPALITE	1	19.5	19.5	0.0	13.4	0.0	5.4	3.0	0.0	132	108	24	0.00	0.00	0.00	0.00
KC-4		44	ELKO	OPALITE	1	36.2	36.2	3.0	26.1	14.7	14.5	3.9	0.0	142	132	10	1.00	0.00	0.00	0.00
KC-3		45	NOTTYPABL	OPALITE	1	35.2	0.0	0.0	19.2	0.0	0.0	3.0	0.0	122	0	0	0.00	0.00	0.00	0.00
KC-3		46	ELKO	OPALITE	2	32.3	32.3	5.5	21.0	12.4	10.3	6.1	0.0	153	110	43	1.00	0.00	0.00	0.00
KC-3		47	GATECLIFF	OPALITE	1	46.7	43.1	12.5	24.9	11.0	15.9	4.5	0.0	149	72	77	0.92	0.00	0.00	0.00
N4546800E536500-UTM		48	STEMMED	BASALT	2	52.3	52.3	30.2	27.0	17.1	19.6	7.7	9.7	0	0	0	1.00	1.94	0.63	0.58
ML-3		49	ROSEGATE	OBSIDIAN	2	25.9	25.9	9.2	13.1	7.9	5.8	2.0	0.0	152	119	33	1.00	1.98	0.60	0.36
ML-3		50	ROSEGATE	OPALITE	1	25.2	25.2	2.2	19.7	9.1	7.3	3.0	0.0	115	103	12	1.00	1.28	0.46	0.09
N15E22	N15E22	51	NOTTYPABL		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N18E30	N18E30	41	GATECLIFF	OPALITE	2	31.6	30.3	4.5	23.4	9.0	0.0	5.0	0.0	160	56	104	0.96	0.00	0.00	0.00
N24E7	N24E7	38	ROSEGATE	OPALITE	1	17.8	17.8	3.3	16.9	6.9	6.1	4.0	0.0	123	112	11	1.00	1.06	0.41	0.19
N26E12	N26E12	37	ELKO	OPALITE	1	38.8	35.5	7.1	24.4	16.0	13.8	5.0	0.0	154	110	44	0.92	1.59	0.66	0.19
N33E9	N33E9	33	DSN	OPALITE	2	23.0	19.6	0.0	13.3	13.3	7.8	2.5	0.0	185	153	30	0.00	0.00	1.00	0.00
N33E9	N33E9	34	NOTTYPABL	OPALITE	1	31.3	0.0	0.0	16.2	0.0	0.0	4.0	0.0	125	102	24	0.00	1.94	0.00	0.00
N33E9	N33E9	36	NOTTYPABL	OBSIDIAN	1	21.5	0.0	0.0	13.6	0.0	0.0	5.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N35E10	N35E10	30	NOTTYPABL	OPALITE	1	47.0	47.0	0.0	24.3	24.3	0.0	7.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N35E29	N35E29	52	ELKO	OPALITE	1	30.1	30.1	0.7	20.8	20.0	13.2	7.0	0.0	160	130	30	1.00	1.44	0.96	0.02
N36E12	N36E12	29	GATECLIFF	OPALITE	1	30.3	27.1	13.0	17.8	14.9	11.2	6.0	0.0	303	61	242	0.90	0.00	0.00	0.00
N37E12	N37E12	28	OUTOFKEY	OPALITE	1	23.3	23.3	1.7	15.8	10.0	6.7	3.0	0.0	163	56	107	1.00	1.48	0.64	0.08
N38E29	N38E29	23	OUTOFKEY	OPALITE	2	37.8	34.2	0.0	14.1	13.6	0.0	5.0	0.0	0	0	0	0.90	2.68	0.96	0.00
N38E29	N38E29	24	NOTTYPABL	BASALT	1	18.0	0.0	0.0	30.7	0.0	0.0	7.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N38E29	N38E29	26	NOTTYPABL	OPALITE	1	36.4	0.0	0.0	10.5	0.0	0.0	5.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N39E23	N39E23	40	ELKO	OPALITE	1	36.1	32.1	10.9	26.5	17.0	13.5	4.0	0.0	198	117	81	0.89	0.00	0.65	0.00
N47E26	N47E26	13	ELKO	OPALITE	1	0.0	0.0	5.7	0.0	17.9	12.0	4.0	0.0	146	135	11	1.00	0.00	0.00	0.00
N47E5	N47E5	22	NOTTYPABL	OPALITE	1	0.0	0.0	6.2	24.5	14.0	13.6	6.0	0.0	164	102	62	0.00	0.00	0.57	0.00
N48E0	N48E0	12	HUMBOLDT	OPALITE	1	44.6	39.1	0.0	24.4	10.0	0.0	6.0	0.0	0	0	0	0.87	1.83	0.41	0.00
N48E12	N48E12	21	NOTTYPABL	OPALITE	1	50.4	50.4	0.0	22.1	13.1	0.0	11.0	0.0	0	0	0	1.00	2.28	0.59	0.00
N48E8	N48E8	39	LSN	OPALITE	2	38.2	38.2	11.0	18.4	18.4	10.3	2.0	0.0	0	156	0	0.00	0.00	0.00	0.00
N49E4	N49E4	19	ELKO	OPALITE	1	39.3	35.5	7.0	20.5	13.0	12.3	5.0	0.0	172	133	39	0.90	1.92	0.63	0.18
N49E4	N49E4	20	ELKO	OPALITE	1	0.0	0.0	5.3	20.2	12.5	9.8	5.0	0.0	153	124	29	1.00	0.00	0.62	0.00
N51E19	N51E19	11	NOTTYPABL	OPALITE	1	22.3	0.0	0.0	21.5	0.0	0.0	4.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N51E24	N51E24	10	NOTTYPABL	OPALITE	1	17.0	0.0	0.0	12.4	0.0	0.0	3.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N53E19	N53E19	18	OUTOFKEY	OBSIDIAN	1	35.3	35.3	0.0	19.1	11.0	10.5	4.0	0.0	135	119	16	1.00	1.85	0.58	0.00
N54E26	N54E26	2	OUTOFKEY	OPALITE	2	34.7	32.4	5.7	19.0	10.2	9.0	8.0	0.0	152	114	38	0.94	1.83	0.54	0.16
N54E26	N54E26	3	OUTOFKEY	OPALITE	1	0.0	0.0	0.0	0.0	0.0	9.6	6.0	0.0	0	124	0	0.00	0.00	0.00	0.00
N54E26	N54E26	4	ELKO	OPALITE	1	34.0	29.7	10.5	21.8	15.5	10.2	4.5	2.0	162	140	22	0.87	1.56	0.71	0.31
N54E26	N54E26	5	NOTTYPABL	OPALITE	1	17.0	0.0	0.0	14.5	0.0	0.0	2.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N54E26	N54E26	6	NOTTYPABL	OPALITE	1	34.2	0.0	0.0	19.8	0.0	0.0	4.0	0.0	0	0	0	0.00	0.00	0.00	0.00
N54E26	N54E26	7	ROSEGATE	OPALITE	1	0.0	0.0	0.0	19.8	9.4	8.8	6.0	0.0	165	129	35	0.00	0.00	0.00	0.00
N54E26	N54E26	8	ROSEGATE	OBSIDIAN	2	27.1	27.1	4.5	15.7	8.5	6.7	4.0	0.0	175	116	59	0.00	0.00	0.00	0.00
N54E26	N54E26	9	HUMBOLDT	OPALITE	2	33.4	31.8	0.0	13.6	12.3	0.0	3.5	0.0	0	0	0	0.95	2.46	0.90	0.00
N54E28	N54E28	1	ROSEGATE	OPALITE	2	32.1	32.1	5.6	15.2	8.7	6.4	3.0	0.0	134	119	15	1.00	2.11	0.57	0.17
N8E5	N8E5	42	NOTTYPABL	OBSIDIAN	1	31.7	0.0	0.0	16.7	0.0	0.0	1.0	0.0	0	0	0	0.00	0.00	0.00	0.00

APPENDIX D. Listing of Artifacts Observed During Survey

Key:

Bif	= Biface
Prfrm	= Preform
Asscob	= Assayed Cobble
ModChunk	= Modified Chunk
Percstls	= Percussion Tools
Flktls	= Flake Tools
Exoticma	= Exotic Material
Botglass	= Bottle Glass
Histcera	= Historic Ceramics
Ammu	= Ammunition
Minequip	= Mining Equipment
Otherhis	= Other Historic

unit_no	slope	stone	water	bif	point	prefrm	cores	asscob	modchnk	metate	mano	mortar	pestle	percstls	flktls	exoticmat	botglass	cans	histceram	ammu	autopart	minequip	otherhist
N37E31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N37E32	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N38E1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N38E14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N38E19	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N38E23	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N38E29	0	1	0	16	3	1	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0
N39E14	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N39E23	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N39E26	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
N39E28	0	0	0	8	0	0	1	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0
N39E7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	0	4	20	20
N3E1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N41E12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N41E19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N41E5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	1	0
N42E12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N43E22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N43E25	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N43E28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N44E10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N44E13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N45E12	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N45E13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
N45E14	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
N46E0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
N46E13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N46E2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N46E22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N46E4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	44	0	0	0	0	1
N47E1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	0	0	0	1	0
N47E11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N47E18	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N47E19	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N47E26	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N47E5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	18	0	5	2	36	56
N48E0	1	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N48E12	1	0	0	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N48E2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N48E23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N48E31	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N48E32	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N48E5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	20	1	0	0	0	2
N48E8	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N49E11	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	2	1
N49E4	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0
N50E11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N50E18	1	0	0	0	0	1	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0
N50E9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N51E17	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
N51E19	1	1	1	3	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
N51E20	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N51E22	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N51E23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N51E24	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0
N51E7	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N52E1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N52E31	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N52E4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
N53E12	0	0	0	1	0	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N53E19	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N53E2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N53E5	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N54E26	0	0	0	14	8	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
N54E28	1	0	0	7	1	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
N8E10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N8E16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N8E3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N8E5	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1
N9E3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

unit_no	slope	stone	water	bif	point	prefrm	cores	asscob	modchnk	metate	mano	mortar	pestle	percstls	flktls	exoticmat	botglass	cans	histceram	ammu	autopart	minequip	otherhist
N10E16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N10E17	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N11E23	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
N12E19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
N13E13	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N13E15	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N13E16	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N13E25	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N14E10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N14E16	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N14E18	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N14E24	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N15E1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N15E11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N15E16	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N15E22	0	0	0	5	1	0	2	9	8	0	0	0	0	2	2	0	0	0	0	0	0	0	0
N16E19	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N16E26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
N16E27	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N16E31	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N16E4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N16E7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N16E8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N17E10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N17E16	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N17E21	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
N17E24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N17E6	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N17E9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N18E28	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N18E30	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N18E6	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N20E17	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0
N20E5	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N20E9	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
N21E30	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N22E12	1	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
N22E2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
N22E3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	2
N23E11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N23E24	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N23E25	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N24E15	1	1	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
N24E20	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N24E32	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N24E4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N24E7	1	0	0	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N25E0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
N25E15	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N25E2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N25E5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N26E12	0	0	1	13	1	2	0	0	0	0	0	0	0	0	1	3	0	5	0	0	0	0	0
N26E8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N27E16	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N29E15	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N29E4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
N29E8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
N31E17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N31E29	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N32E1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N33E17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N33E9	0	0	0	12	3	0	2	4	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0
N34E0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N34E1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N34E11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
N34E4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N35E10	0	0	0	15	1	3	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1
N35E13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N35E15	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
N35E29	0	0	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N35E32	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N35E8	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N36E12	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N36E2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N36E20	0	1	1	6	0	0	0	6	6	0	0	0	0	0	0	0	0	2	0	0	0	0	0
N36E21	0	1	1	29	0	0	2	50	6	0	0	0	0	2	0	0	1	0	0	0	0	0	1
N36E29	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N37E12	1	1	0	3	1	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N37E18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
N37E19	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
N37E20	0	1	1	6	0	0	0	20	16	0	0	0	0	2	0	2	0	3	0	0	0	0	0

APPENDIX E. Listing of Prehistoric, Historic, and Modern Features Observed During Survey

unit_no	slope	stone	water	featid	type2	dim1	dim2	comments	continued
N11E23	0	0	0	1	REDUCTION SC	5.00	10.00	EARLY REDUCTION LRG. FLKS. WT/BG VERY DIFFUSE *	AND MELTS INTO BACKGROUND
N12E19	0	0	0	1	MINING FTR	10.00	2.50	HISTORIC BULLDOZER CUT	
N12E19	0	0	0	2	MINING FTR	12.00	5.00	HISTORIC BULLDOZER CUT	
N12E19	0	0	0	3	REDUCTION SC	1.00	1.00	AREA OF OPALITE COBBLES, INTERMIXED W/ JASPER *	AND BASALT NO CULTURAL MATERIAL OBSERVED 2 BANDED TRANSULCENT BLACK CHERT FLKS AND 1 OPALITE, 1 INTERIOR FLAKE, 2 MED. STG. B.T.F.'S NO HT
N13E15	0	0	0	1	REDUCTION SC	45.00	20.00	VERY DIFFUSE INTER/MIDD BT SOME HT	
N13E16	0	0	0	1	REDUCTION SC	6.00	6.00	DIVERSE MATERIAL COBBLE REDUCTION OF GREY BRECCIA*	SOME FLAKE HEAT
N13E25	1	0	0	1	MINING FTR	20.00	5.00	BULLDOZER CUT/OPALITE OUTCROP	
N13E25	1	0	0	2	MINING FTR	30.00	10.00	DOZIER PUSH	
N14E18	0	0	0	1	REDUCTION SC	35.00	10.00	VERY DIFFUSE TOTAL FLKS 10 TO 15 HT LATE BFT FLKS*	AND 1 (4E) BIFACE FRAG
N14E18	0	0	0	2	REDUCTION SC	30.00	40.00	VERY SPARSE L.S. W/ STG. 4 BIF. MID. STG. RED.	125 FLKS NO HT
N14E24	1	0	0	1	MINING FTR	10.00	4.00	BULLDOZER CUT	
N15E16	0	0	0	1	OUTCROP QURR	50.00	30.00	JASPER COBBLE, BOULDER QUARRY EAR. STG. RED. ONLY*	3 HAMMERSTONE SPALLS PURPLE/BROWN BANDED
N15E16	0	0	0	2	REDUCTION SC	3.00	7.00	EARLY STG. RED. LRG. FLKS. PURPLE RED JASPER	
N15E16	0	0	0	3	OUTCROP QURR	20.00	50.00	ASSAYING AND MINIMAL REDUCTION OF JASPER COBBLES*	ERODING OUT OF HILLSIDE PROBABLY PART OF MELINDA'S TRANSECT 3 FEATURE
N15E22	0	0	0	1	COBBLE QURRY	15.00	10.00	EARLY REDUCTION OF COBBLE	
N16E19	1	0	0	1	MINING FTR	20.00	10.00	DOZER CUT, OPALITE BOULDERS, TUFF	
N16E4	0	0	0	1	REDUCTION SC	10.00	10.00	EARLY TO MID. RED. SCATTER SOME HT*	LESS THAN 50 FLKS PER METER SQ
N16E4	0	0	0	2	REDUCTION SC	20.00	20.00	LATE STG. RED. BIF. FRAG (M4) HT*	UP TO 50 FLKS PER METER SQ
N16E4	0	0	0	3	HISTRC DUMP	10.00	8.00	6 HOLE IN TOP 1 FRUIT AND VEG. CIRCULAR CUT	
N16E4	0	0	0	4	REDUCTION SC	20.00	0.00	LIGHT TO SPARSE DENSITY SCATTER	
N17E10	0	0	0	1	REDUCTION SC	0.00	0.00	SPARSE, NO HT, MID. THINNING	
N17E16	0	0	0	1	REDUCTION SC	1.00	0.00	SPARSE OPLAITE LATE BFT, HT FLK. SCATTER	
N17E16	0	0	0	2	HISTRC DUMP	0.00	0.00	HOLE IN TOP CAN PUNCH OPEN	
N17E24	1	0	0	1	ROCK RING	8.00	5.00	POSS. 3 ROCK BLINDS/RINGS WITHIN A NATURAL TALUS*	(RHYOLITE) POCKET, OVERLOOKING DRAINAGE TO SOUTH
N18E28	1	0	0	1	ROCKSHELTER	70.00	70.00	WET MOSS AND ROCK FLOORED *	LITHICS: VERY LATE BIF. THINNING, WHITE OPALITE ONLY NO HT, ONE TYPE INCLUDES PRESSURE. CA 10 CM DEEP CULT BEARING, SILT IN REAR BUT WET, MOSS COVERED, MUCH ROOF SPILL.
N18E30	1	0	0	1	REDUCTION SC	5.00	8.00	SPARSE SCATTER BEIGE, LATE STG. BIF. RED. DEB. HT	
N18E30	1	0	0	2	HISTRC WALL	0.00	0.00	HISTORIC ROCK FENCE W/ ASSOC. BARBED WIRE *	HW2A PROBABLY DAM. ASSOC. W/ ROCK FENCE BARBS= FLAT GALVANIZED TWO PRONGED, MACHINE CUT.
N18E30	1	0	0	3	HISTRC WALL	0.00	0.00	CAUSED SOME DAMING/ BACKING 1M DEPOSITION *	BEHIND DAM
N18E6	1	0	0	1	REDUCTION SC	4.00	15.00	LIGHT DENSITY OF SMALL MED. STG./HT UNKNOWN	
N18E6	1	0	0	2	REDUCTION SC	3.00	0.00	1 BIFACE AND SPARSE FLAKES	
N20E17	0	0	1	1	REDUCTION SC	2.00	2.00	BASALT LARGE PRIMARY	
N20E17	0	0	1	2	REDUCTION SC	15.00	10.00	WHITE OPALITE MID-LATE SPARSE HT	
N20E5	1	0	0	1	REDUCTION SC	4.00	25.00	SPARSE OPALITE FLKS CH BIFACE	
N20E9	1	0	0	1	REDUCTION SC	10.00	10.00	AT CONFLUENCE OF DRAINAGE 3 MID. STG. OPALITE FLKS	PROBABLY BIFACE THINNING HEAT TREATED
N20E9	1	0	0	2	OTHER,MODRN	20.00	10.00	SMALL EARTH DAM AND DRY POND OR PROSPECT	
N21E30	1	0	0	1	REDUCTION SC	4.00	3.00	SMALL REDUCTION STATION, HT, LATE BIF. REDUCTION*	MOD. DENSITY POSSIBLE SINGLE EVENT LOCUS ONE BIFACE FRAG
N21E30	1	0	0	2	REDUCTION SC	10.00	10.00	SMALL LS, LATE REDUCTION, SOME HT	
N22E12	1	0	0	1	REDUCTION SC	20.00	20.00	VERY SPARSE LATE STG. RED. SCATTER*	SOME PRESSURE FLAKING. TWO METATE FRAGS AND A LATE STG. 4 BIFACE FRAG. 1 TABULAR BASALT, 1 DENSE BASALT.
N22E2	0	0	0	1	REDUCTION SC	10.00	10.00	VERY DIFFUSE SCATTER 5.2 flakes/m2	
N22E2	0	0	0	2	REDUCTION SC	10.00	3.00	LIGHT DENSITY, EXCLUSIVELY THIN LARGE, OPALITE*	FLAKES, EARLY THINNING STG.
N22E2	0	0	0	3	REDUCTION SC	20.00	7.00	OPALITE (LIGHT DENSITY) CHUNKY AND EARLY *	THINNING STG. W/ SMALL FLAKES W/ BATTERED EDGES
N22E2	0	0	0	4	REDUCTION SC	50.00	20.00	TWO OPALITE TOOLS (BIFACE STG. 4 AND *	LIZARD SHAPED UNIFACE) LIGHT DENSITY MID TO LATE THINNING STG. FLAKES.
N22E3	0	0	0	1	REDUCTION SC	36.00	30.00	EXTENDS NORTH OUT OF QUAD.	
N22E3	0	0	0	2	REDUCTION SC	40.00	30.00	MIX OF OPALITE AND JASPER AND OBSIDIAN *	LATE STG. RED DOMINANT, EARLY STG. SOME HEAT TREATMENT, LIGHT DENSITY
N22E3	0	0	0	3	REDUCTION SC	80.00	0.00	OPALITE/JASPER SPARSE DENSITY CHUNKS AND MED. FLKS	
N24E15	1	1	1	1	REDUCTION SC	20.00	20.00	DENSE BASE CAMP?*	SEVERAL UNTYPEABLE POINTS; OTHERS ARE TYPEABLE; BASALT CORES; 4 METATE FRAGS, OBSIDIAN LATE PROJECTILE POINT HEAT TREATMENT, A NUMBER OF STG. 4 BIFACES (ALSO HT); OBSIDIAN, BASALT, MULTIPLE OPALITE COLORED DEBITAGE MID. TO LATE STG.; BASALT HAMMERSTONE, OPALITE DRILL.
N24E15	1	1	1	2	REDUCTION SC	0.00	0.00	MID TO LATE BIF. REDUCTION*	WHITE OPALITE, ON SLOPE; RARER SLATE GREY OPALITE; STG. 5 BIFACE ON TRANSECT 10 FLKS PER METER SQ
N24E15	1	1	1	3	MINING FTR	30.00	6.00	BULLDOZER CUT PROSPECT	
N24E15	1	1	1	4	REDUCTION SC	0.00	0.00	SEE TRANSECT 3-5	
N24E15	1	1	1	5	REDUCTION SC	55.00	45.00	+STG. 5 BIF., OBSIDIAN, 45% SMALL BASALT*	MULTI COLORED OPALITE, LIGHT DENSITY 80% HEAT TREATED MAX DENSITY PER METER SQ
N24E15	1	1	1	6	REDUCTION SC	45.00	20.00	2 BIF. STG. 4, MULTI COLORED OPALITE*	36/sq.m MAX DENSITY; 40% SMALL, 85% HEAT TREATED
N24E15	1	1	1	7	REDUCTION SC	15.00	10.00	2 BIF. TIP FRAGS; WHITE OPALITE*	MED. TO SMALL SIZE (60% SMALL) 80% NOT HEAT TREATED; MORE BIFACES OFF 4m TRANSECT LINE.
N24E15	1	1	1	8	REDUCTION SC	15.00	0.00	SPARSE LITHIC SCATTER WHITE, NO HT, MED-SMALL FLKS	

unit_no	slope	stone	water	featid	type2	dim1	dim2	comments	continued
N24E20	1	0	0	1	REDUCTION SC	2.00	2.00	LIGHT DENSITY SCATTER OF PREDOMINANT WT/OPALITE*	LATE, HT, SMALL-MED. INCLUDES FOUR LRG. BIFACE FRAGS NOTE DEB. IS NOT OF SAME MATERIAL AS BIF. FRAG.
N24E20	1	0	0	2	REDUCTION SC	7.00	5.00	REDUCTION STATION, MID-LATE THINNING, HT.*	MODERATE DENSITY WHITE OPALITE AND PRESSURE FLKS.
N24E20	1	0	0	3	REDUCTION SC	10.00	5.00	25-35 WT/OPALITE BFT MIDDLE NO HT	
N24E20	1	0	0	4	REDUCTION SC	5.00	5.00	10+ FLKS. WT/OPALITE LBFT	
N24E20	1	0	0	5	REDUCTION SC	10.00	15.00	30-40 LBFT FLKS. OF WT/OPALITE, HT	
N24E32	0	0	0	1	REDUCTION SC	10.00	30.00	LIGHT LITHIC SCATTER MID-LATE RED. HT, FEW CHUNKY	
N24E4	0	0	0	1	OUTCROP QURR	30.00	20.00	SOME SILICIFIED MATERIAL BUT LITTLE EVIDENCE USE	
N24E4	0	0	0	2	REDUCTION SC	8.00	30.00	E, L BIFACE THINNING SOME HT DIFFUSE	
N24E4	0	0	0	3	REDUCTION SC	2.00	4.00	INTERIOR LATE BIF. THINNING NHT	
N24E7	1	0	0	1	REDUCTION SC	20.00	30.00	A FEW CULTURAL FLAKES MIXED IN WITH NAT. BROK'N OP	
N24E7	1	0	0	2	REDUCTION SC	6.00	5.00	OPALITE SCATTER OF ca 35 FLAKES; NONE HT*	LATE STG. B.T.F; MEDIUM TO SMALL SIZE
N24E7	1	0	0	3	REDUCTION SC	45.00	30.00	VERY DIFFUSE WT/BG ; BUTTERSCOTCH; LATE	
N24E7	1	0	0	4	REDUCTION SC	65.00	50.00	LIGHT MOD. DENSITY MID-LATE REDUCTION 5 BIF. FRAG*	IN 2 SQ M
N24E7	1	0	0	5	REDUCTION SC	20.00	10.00	MOD. DENSITY MID REDUCTION	
N25E5	0	0	0	1	REDUCTION SC	15.00	15.00	MID TO LATE STG. LITH. SCATTER, STG. 4 BIF. FRAG*	20 FLKS PER METER SQ
N25E5	0	0	0	2	REDUCTION SC	20.00	30.00	LIGHT; OPALITE; HT, 70% SMALL FLKS. *	27 FLKS PER METER SQ
N26E12	0	0	1	1	REDUCTION SC	4.00	3.00	WITHIN MODERATE SCATTER MID/LATE BT; HT	VARIOUS MATERIALS, OBSIDIAN FLK
N26E12	0	0	1	2	MOD ROAD	5.00	0.00	OVERGROWN BULLDOZED ROAD	
N26E12	0	0	1	3	MOD ROAD	5.00	0.00	POSSIBLY BULLDOZED ROAD	
N26E12	0	0	1	4	OTHER,MODRN	0.00	0.00	EARTH DAM; AND DRY CATTLE POND	
N26E12	0	0	1	5	MOD ROAD	5.00	0.00	SEE FEATURE A	
N26E12	0	0	1	6	REDUCTION SC	10.00	10.00	LITHIC WITH ELKO POINT: HT AND BIFACES	
N26E12	0	0	1	7	REDUCTION SC	30.00	30.00	DIFFUSE SCATTER MID TO LATE	
N26E8	1	0	0	1	REDUCTION SC	50.00	50.00	SPARSE L.S MID TO LATE STG. RED. SCATTER*	METATE TABULAR BASALT FRAG. 2 STG. 4 BIF. TIP; MINOR HTREATMENT
N27E16	1	0	0	1	QUARRY PIT	70.00	100.00	REDUCTION NO BIFACES MED. QUALITY*	MOSTLY CREAM RASPBERRY BANDING. PIT INTERCEPTS SLOPE 40m SURFACE OUTCROP TO ACCESS BETTER STUFF.
N27E16	1	0	0	2	QUARRY PIT	20.00	20.00	LOW GRADE PINK CREAM REDUCTION *	POSSIBLE INTRUSION INTO SLOPE 20m BELOW SMALL OUTCROP PIT IS EPHEMERAL IF THERE AT ALL.
N27E16	1	0	0	3	REDUCTION SC	20.00	20.00	BIF. THINNING FLKS. WT/ OPALITE, 200 FLKS.	
N29E4	0	0	0	1	HISTRC ROAD	4.00	0.00	PROBABLE HISTORIC ROAD	
N29E4	0	0	0	6	MOD ROAD	5.00	0.00	PROBABLY LESS THAN 50 YEARS OLD	
N31E17	0	0	0	1	MINING FTR	10.00	20.00	RECTANGULAR BULLDOZED TRENCH	
N31E17	0	0	0	2	MINING FTR	10.00	20.00	RECTANGULAR BULLDOZED TRENCH	
N31E17	0	0	0	3	REDUCTION SC	20.00	20.00	LIGHT EARLY STG. REDUCTION WT/ OPALITE *	NO ACUTE PLATFORM
N31E17	0	0	0	4	REDUCTION SC	50.00	50.00	WT/OPALITE SRG. 3 50% HEAT TREATMENT	
N31E17	0	0	0	5	MINING FTR	10.00	25.00	NO OPALITE OUTCROP	
N31E17	0	0	0	6	MINING FTR	20.00	10.00	NO OPALITE OUTCROP	
N31E17	0	0	0	7	MINING FTR	10.00	0.00	BULLDOZER SCRAPE	
N31E29	0	1	0	1	OUTCROP QURR	120.00	90.00	EXTENSIVE OQ OF LOW BG/WT/OP OF BOULDERS*	LIGHT-MED. HEAVY DEB. SCATTER. MIX BIF. RED. MUCH DEBRIS
N31E29	0	1	0	2	OUTCROP QURR	30.00	50.00	OUTCROP QUARRY OF OLD BOULDERS QUADRANT*	SOUTH BOUNDRY UNKNOWN. MOD-HEAVY MIXED BIF. REDUCTION W/ABUNDANT?
N32E1	1	0	0	1	REDUCTION SC	1.00	0.00	MINIMAL ASSAY OF LOW QUALITY WT/OPALITE *	10 EARLY FLKS. AND ANGULAR DEBRIS
N33E17	1	0	0	1	MINING FTR	15.00	5.00	DOZER CUT	
N33E17	1	0	0	2	MINING FTR	10.00	20.00	DOZER TRENCH SHALLOW	
N33E17	1	0	0	3	MINING FTR	15.00	10.00	DOZER TRENCH SHALLOW	
N33E17	1	0	0	4	MINING FTR	15.00	15.00	PIT	
N33E17	1	0	0	5	MINING FTR	15.00	5.00	TRENCH	
N33E9	0	0	0	1	COBBLE QURRY	110.00	60.00	GOES BEYOND QUADRANT TO SOUTH COMPRISED OF*	GOOD QUALITY BASALT COBBLES; NUMEROUS ONES (>10) ASSAYED, AT LEAST ONE CORE. SOME OPALITE FLAKES NEAR ASSAYED COBBLE CONCENTRATION.
N33E9	0	0	0	2	REDUCTION SC	2.00	2.00	DENSER CONS. W/ A 2M x 2M M/L BIF. THINNING *	NHT, DISCRETE REDUCTION, VARIETY OF NEW MATERIAL
N33E9	0	0	0	3	REDUCTION SC	0.00	0.00	MOSTLY WHITE NON-HT LRG. TO MED.	
N34E11	0	0	0	1	MOD ROAD	2.00	0.00	NOT ON TOPO	
N34E11	0	0	0	2	REDUCTION SC	3.00	3.00	SMALL	
N34E11	0	0	0	3	MINING FTR	5.00	10.00	BULLDOZER CUT OR MINNING PIT	
N34E11	0	0	0	4	REDUCTION SC	20.00	20.00	DIFFUSE MID TO LATE WHITE HT	
N34E11	0	0	0	5	MINING FTR	10.00	13.00	1M DEEP MAYBE MERCURY MINNING PROSPECT PIT*	LOOKS TOO OLD FOR RECENT GOLD WORKS
N34E11	0	0	0	6	REDUCTION SC	10.00	13.00	LRG TO SMALL FLK SCATTER; WHITISH GREY B.T.F'S *	NO HEAT TREATMENT, SPARSE SCATTER
N34E4	0	0	0	1	MOD ROAD	4.00	0.00		
N35E10	0	0	0	1	REDUCTION SC	3.00	3.00	HT, BIF.	
N35E10	0	0	0	2	REDUCTION SC	5.00	5.00	LOTS OF HT LRG. BIF. EML MED. SEV. OP. VARIETIES	
N35E10	0	0	0	3	REDUCTION SC	20.00	50.00	LRG. LITHIC SCATTER EXTENDING WELL OUT OF QUAD.*	(WEST) AND INTO HEAVY SAGE; MID TO LATE; LOTS OF HT; PRIMARILY WHITE/ BEIGE
N35E10	0	0	0	4	REDUCTION SC	20.00	30.00	LRG, MED, SMALL, B.T.F'S OF WT/ TRANSLUCENT GREY	
N35E10	0	0	0	5	REDUCTION SC	0.00	0.00	OPALITE FLKS SPARSE TO LIGHT DENSITIES NO HT*	ONE EARLY STG. 4 BIF. FRAG
N35E10	0	0	0	6	REDUCTION SC	5.00	5.00	SCATTER OF 30 LRG. MED. B.T.F. NO HT LIGHT DENSITY	
N35E10	0	0	0	7	REDUCTION SC	12.00	10.00	SEE N35 E10 LRS CONT. WRKSHT P. 2 OF 2	
N35E10	0	0	0	8	REDUCTION SC	10.00	10.00	SEE N35 E10 LRS CONT. WRKSHT P. 2 OF 2	
N35E13	1	0	0	1	MINING FTR	10.00	5.00	PROBABLE PROSPECT	
N35E15	0	1	0	1	MINING FTR	5.00	10.00	RECENT DOZER PROSPECT	
N35E15	0	1	0	2	MINING FTR	10.00	7.00	PROSPECT	
N35E15	0	1	0	3	MINING FTR	4.00	40.00	BULLDOZER CUT	

unit_no	slope	stone	water	featid	type2	dim1	dim2	comments	continued
N35E29	0	0	0	1	REDUCTION SC	0.00	0.00	GENERAL DIFFUSE FLK SCAT. IN BIG SAGE BRUSH COVER*	SEE MAP FOR DIAMETER
N35E29	0	0	0	2	REDUCTION SC	0.00	0.00	GENERAL DIFFUSE FLK SCAT. IN BIG SAGE BRUSH COVER*	SEE MAP FOR DIAMETER
N35E29	0	0	0	3	REDUCTION SC	0.00	0.00	GENERAL DIFFUSE FLK SCAT. IN BIG SAGE BRUSH COVER*	SEE MAP FOR DIAMETER
N35E32	1	0	0	1	CAIRN	0.00	0.00	2 CAIRNS-5 COURSE + 3 COURSE-HISTORIC?	
N35E8	0	0	0	1	REDUCTION SC	40.00	0.00	NHT M-L BIFACE THINNING	
N35E8	0	0	0	2	REDUCTION SC	5.00	5.00	HT BIF. E4	
N35E8	0	0	0	3	MINING FTR	20.00	6.00	MINING PROSPECTS (PROBABLE)	
N35E8	0	0	0	4	MINING FTR	15.00	5.00	MINING PROSPECTS (PROBABLE)	
N35E8	0	0	0	5	REDUCTION SC	20.00	10.00	WHITE OPALITE CHUNKY SHATTER AND THINNING FLKS*	OF MEDIUM TO SMALL SIZE. LIGHT DENSITY 100 TOTAL PIECES
N35E8	0	0	0	6	REDUCTION SC	120.00	90.00	SPARSE TO LIGHT DENSITY SCATTER OF WT/TAN/PURP*	OPALITE, MOSTLY MEDIUM SIZE, MID STG. REDUCTION FLKS., THIN AND FEW CHUNKY PIECES
N36E12	1	0	0	1	MINING FTR	15.00	6.00	PROSPECT	
N36E12	1	0	0	2	MOD ROAD	4.00	0.00	UN-MAPPED ROAD	
N36E12	1	0	0	3	REDUCTION SC	5.00	5.00	DIFFUSE ; MIDDLE; 50/50 HT	
N36E12	1	0	0	4	MOD ROAD	2.50	0.00	TWO TRACK	
N36E12	1	0	0	5	REDUCTION SC	40.00	10.00	SPARSE SCATTER OF WHITE GREY OPALITE SOME MED.FLK*	HEAT TREATED SHATTER, HEAT TREATED B.T.F. MID STG., 15 TOTAL
N36E12	1	0	0	6	MINING FTR	2.00	20.00	BULLDOZER CUT	
N36E12	1	0	0	7	MINING FTR	7.00	2.00	BULLDOZER CUT	
N36E12	1	0	0	8	COBBLE QURRY	40.00	30.00	GOOD QAULITY OPALITE	
N36E2	0	0	0	1	REDUCTION SC	2.00	2.00	WT/OPALITE LIGHT SCAATER OF FLKS. *	ASSAYED EARLY REDUCTION RAW
N36E20	0	1	1	1	REDUCTION SC	50.00	50.00	VERY OCCASIONAL SMALL TO MED. RED. AT LEDGE OPAL.*	SILICIFICATION ZONE 80
N36E20	0	1	1	2	QUARRY PIT	20.00	60.00	AT LEAST 2 SMALL Q PITS W/ MODERATE L.S. *	SURROUNDING THEM. GOOD QUALITY CREAM/ GREY (PITS - 3M X 2M X .5 DEEP)
N36E20	0	1	1	3	MINING FTR	0.00	0.00	PROBABLE MODERN MINING PIT IN DRAINAGE*	NICHE IN LOW CANYON WALL
N36E20	0	1	1	4	MINING FTR	20.00	10.00	DOZER TRENCHES*	10X15M
N36E20	0	1	1	5	MINING FTR	10.00	10.00	RECENT BULLDOZED PROSPECT	
N36E20	0	1	1	6	MOD ROAD	0.00	3.00	MODERN DOZER SCRAPE ROAD	
N36E20	0	1	1	7	MINING FTR	10.00	15.00	BULLDOZER CUT	
N36E20	0	1	1	7	QUARRY PIT	30.00	60.00	QUARRY PIT CONTAINING 6 QUARRY PITS *	DENSITY MODERATE; COLOR VARIATION MODERATE: MOSTLY WHITE, SOME RED, SOME BLUE AND WHITE,BANANA. OUTCROPPING OPALITE W/ QUARRING DEBRIS TO THE NORTH
N36E21	0	1	1	1	QUARRY PIT	60.00	143.00	SEE COMMENTS ON INVENTORY FORM CONT. SHEET*	TOO COMPLEX
N36E21	0	1	1	2	QUARRY PIT	30.00	15.00	SEE COMMENTS ON INVENTORY FORM CONT. SHEET*	TOO COMPLEX
N36E21	0	1	1	3	QUARRY PIT	10.00	15.00	SEE COMMENTS ON INVENTORY FORM CONT. SHEET*	TOO COMPLEX
N36E21	0	1	1	4	CAIRN	1.50	50.00	CAIRN OF OP. ADJACENT TO QP IN FEATURE A	
N36E21	0	1	1	5	QUARRY PIT	8.00	50.00	DIRT AND OPALITE PIT W/ BERM	
N36E21	0	1	1	6	MOD ROAD	0.00	0.00	RECENT DRILLERS ROAD AROUND ENTIRE PIT*	HIGH NUMBER OF BIFACES JUST EAST OF PIT
N36E21	0	1	1	7	CAIRN	1.50	1.50	CAIRN OF LESS THAN 50 SMALL OPALITE BOULDERS	
N36E21	0	1	1	8	REDUCTION SC	30.00	20.00	DENSE HEAVY SCATTER EAST QUARRY PIT AT S. EDGE	
N36E21	0	1	1	9	QUARRY PIT	3.00	2.00	SMALL PIT AND BOULDER BERM VERY SHALLOW *	1% PRIMARY REDUCTION
N36E29	0	0	0	1	REDUCTION SC	10.00	10.00	DIFFUSE LATE BIF. FLKS. AND 1 STG. 2 BIF. FRAG	
N36E29	0	0	0	2	REDUCTION SC	0.00	0.00	GENERAL DIFFUSE BIF. FLKS. IN SAGE COVERED AREA*	MIDDLE AND LATE BIFACE REDUCTION
N37E12	1	1	0	1	REDUCTION SC	11.00	7.00	LIGHT SCATTER OF WT/TAN OPALITE FLKS. *	SHATTER AND BIF. FRAGS; ONE SMALL EARLY STG. 4 BIF. FRAG; TWO LATE STG. 3 BIF. FRAGS; 30 MED. TO SMALL SIZE FLKS, MID TO LATE STG. REDUCTION
N37E18	0	0	0	1	MINING FTR	20.00	7.00	DEEP MOD. PROSPECT TRENCH COVERED W/RHYOLITE TUFF	
N37E18	0	0	0	2	OUTCROP QURR	10.00	25.00	POOR QUALITY WT/GREY OPALITE W/ SOME REAL FLKS.*	ASSOC. COBBLE CAIRN ON TOP OF OUTCROP
N37E18	0	0	0	3	MINING FTR	5.00	25.00	MODERN DOZER PROSPECT, CA 1M DEEP	
N37E18	0	0	0	4	MOD ROAD	3.00	0.00		
N37E18	0	0	0	5	PIT,UNK	7.00	7.00		
N37E18	0	0	0	6	MOD ROAD	3.00	0.00	TWO-TRACK ROAD REMAINS	
N37E18	0	0	0	7	MINING FTR	30.00	12.00	BULLDOZER CUT	
N37E18	0	0	0	8	MINING FTR	15.00	7.00	BULLDOZER CUT	
N37E19	0	1	0	1	OUTCROP QURR	14.00	20.00	OUTCROP QUARRY W/LITHIC SCATT; CHUNKY; PRIM. RED.*	LOW BOULDERS ONLY, NOT FINE QUALITY. LITHIC SCATTER 60M X 90M
N37E19	0	1	0	2	MINING FTR	7.00	12.00	DOZER PROSPECT PIT AND BERM	
N37E19	0	1	0	3	REDUCTION SC	40.00	0.00	AT NORTH END OF FEATURE*	HAVE SPARSE TO LIGHT SCATTER OF WHITE/BLUE OPALITE, MOSTLY LARGE TO MEDIUM B.T.F.'S EARLY STAGE TO MIDDLE. 200 FLAKES NEAR TRANSECT 4. ALSO1 EARLY STAGE 2 BIFACE FRAG. EST 1,000 FLAKES TOTAL.
N37E19	0	1	0	4	MINING FTR	20.00	8.00	HISTORIC MERCURY MINING PROSPECT PIT*	3 CIRCULAR RANGING FROM 2 TO 4 M IM DIAMETER ONE ROCK CAIRN ASSOC. TO EAST OF PITS. MILLED WOOD AND REBARB.
N37E19	0	1	0	5	REDUCTION SC	20.00	20.00	10 TO 15 FLKS ADMIST ALOT OF NATURAL COLLUVIUM	
N37E19	0	1	0	6	MINING FTR	5.00	5.00	HISTORIC PIT	
N37E20	0	1	1	1	MINING FTR	5.00	15.00	DOZER SCRAPE	
N37E20	0	1	1	2	QUARRY PIT	100.00	75.00	COMPLEX*	18+ PITS; INTENSE PRIMARY REDUCTION; SEVERAL PITS A METER PLUS DEEP. DISTURBED BADLY BY A BULLDOZER CUT THROUGH ITS DENSEST QUATER; 1000'S OF COBBLES.
N37E20	0	1	1	3	MINING FTR	40.00	20.00	DEEP DOZER PIT *	APPARENTLY THROUGH QUARRY PIT; LOTS OF WORKED COBBLES
N37E20	0	1	1	4	CAIRN	1.00	0.60	MINING CLAIM MARKER CAIRN?	
N37E20	0	1	1	5	MINING FTR	8.00	10.00	RECENT DOZER PROSPECT	

unit_no	slope	stone	water	featid	type2	dim1	dim2	comments	continued
N37E20	0	1	1	6	OTHER,MODRN	20.00	25.00	EARTH DAM (2M TALL) SMALL RESERVIOR IN DRAINAGE	
N37E20	0	1	1	7	CAIRN	0.90	0.70	HISTORIC CAIRN	
N37E20	0	1	1	8	QUARRY PIT	105.00	30.00	TOO COMPLEX SEE FEATURE FORM	
N37E20	0	1	1	9	QUARRY PIT	60.00	15.00	QUARRY PIT COMPLEX CONTAINING OUTCROP*	QUARRIES TO THE NORTH AND 3 QUARRY PIT TO THE SOUTH . WHITE OPALITE AND TRANSLUCENT GREY/BLUISH QUARRY PIT BERMS CONTAINING CHUNKY PRIMARY REDUCTION DEBRIS AND EARLY STAGE BIFACES.
N37E20	0	1	1	10	OUTCROP QURR	15.00	30.00	OUTCROP QUARRY *	CONTAINING OF A LARGE LITHIC SCATTER. A QUARTZITE HAMMERSTONE AND AN UNASSOCIATED METATE FRAG. DEBITAGE WAS MODERATE AND SUGGESTIVE OF PRIMARY REDUCTION.
N37E32	0	1	0	1	QUARRY PIT	15.00	20.00	INSET INTO SLOPE AMID ABUNDANT OP COBBLES/*	BOULDERS WHICH MAY ALSO HAVE BEEN TOOLSTONE SOURCE
N37E32	0	1	0	2	OUTCROP QURR	20.00	0.00	SMALL MINIMAL USED OUTCROPS HARD MILK WT/OP*	LIGHT TO MEDIUM SCATTER LATE DEB. AND EARLY RED. DEB.
N38E14	1	1	0	1	MINING FTR	5.00	3.00	MINING PROBE	
N38E14	1	1	0	2	OUTCROP QURR	60.00	30.00	OUTCROP QUARRY; SOME COBBLE QUARRYING*	EVIDENCED AS WELL
N38E14	1	1	0	3	MINING FTR	28.00	10.00	BULLDOZER PUSH	
N38E14	1	1	0	4	MINING FTR	5.00	10.00	DOZER PROSPECT TRENCH/ BERM	
N38E14	1	1	0	5	MINING FTR	5.00	15.00	DOZER PROSPECT TRENCH/ BERM	
N38E29	0	1	0	1	REDUCTION SC	12.00	10.00	LBT NO HT ONE CONCENTR. EARLY BIF. TH.;	SINGLE BLADE
N38E29	0	1	0	2	REDUCTION SC	20.00	5.00	MID LATE BIF. RED. NO HT ALSO EARLY BIF. FLK TOOL	
N38E29	0	1	0	3	REDUCTION SC	5.00	5.00	VARIOUS MATERIALS; EARLY, LATE NO HT BIF RED.	
N38E29	0	1	0	4	REDUCTION SC	2.00	2.00	SMALL RED. GREY OPALITE MID TO LATE NO HT	
N38E29	0	1	0	5	REDUCTION SC	3.00	3.00	LRG. NO HT BIF. RED. EARLY LATE-MIDDLE	
N38E29	0	1	0	6	REDUCTION SC	2.00	3.00	MORE THAN ONE? HT PRESENT EARLY-MIDDLE-LATE	
N38E29	0	1	0	7	REDUCTION SC	3.00	4.00	BIF. RED. E,M.L WHT DIVERSE MAT.	
N38E29	0	1	0	8	REDUCTION SC	15.00	9.00	RED. OF LRG. FLK. OR BLK. STG. 2-3 RED. AND*	ADDTION MID-LATE BIF. RED. AT LEAST TWO DISTINCT MATERIALS; WHITE OPALITE
N38E29	0	1	0	9	REDUCTION SC	10.00	7.00	EARLY-MID-LATE STG. 3 BIF. FLK PINK GREY WHITE OP*	SOME HT ON LATE THINNING FLKS AN EARLY 4 BIF. FRAG
N38E29	0	1	0	10	MOD ROAD	5.00	0.00		
N38E29	0	1	0	11	REDUCTION SC	3.00	2.00	EARLY STG. 2-3 THINNING FLKS IN SMALL FEATURE	
N38E29	0	1	0	12	MOD ROAD	5.00	0.00		
N38E29	0	1	0	13	MOD ROAD	30.00	3.00	DOZER CUT	
N38E29	0	1	0	14	REDUCTION SC	15.00	10.00	LITHIC SCATTER ASSOC. W/ CUT MID TO LATE RED. *	WHITE NON HT OPALITE
N38E29	0	1	0	15	MOD ROAD	45.00	3.00	EXTEND OUT OF QUADRANT	
N38E29	0	1	0	16	REDUCTION SC	15.00	15.00	DIFFUSE SCATTER OF EARLY MID BIF. RED. NOT MUCH HT	
N38E29	0	1	0	17	REDUCTION SC	20.00	10.00	DIFFUSE SCATTER OF EARLY MID BIF. RED.*	MULTIPLE COLORS (GREY, BUTTERSCOTCH, AND WHITE) NOT MUCH HT
N38E29	0	1	0	18	REDUCTION SC	15.00	10.00	DIFFUSE SCATTER E,M AND LATE, *	BUT PRIMARILY EARLY RED. WHITE BEIGE OPALITE HT W/ LATE RED. ONE HT BIF. FRAG
N38E29	0	1	0	19	REDUCTION SC	30.00	45.00		
N38E29	0	1	0	20	MINING FTR	10.00	5.00	BLADE CUT PROSPECT	
N38E29	0	1	0	21	CAIRN	0.00	0.00		
N38E29	0	1	0	22	REDUCTION SC	2.00	2.00	WT/BG OPALITE OUTREH EARLY RED. NON HT	
N38E29	0	1	0	23	MOD ROAD	4.00	90.00	UN-MAPPED ROAD OF UNKNOWN AGE	
N39E14	1	1	0	1	MINING FTR	5.00	25.00	MODERN DOZER PROSPECT TRENCH & BERM 1-2CM DEEP	
N39E14	1	1	0	2	MINING FTR	100.00	10.00	BULLDOZER SWATH AND BERM	
N39E14	1	1	0	3	MINING FTR	10.00	20.00	BULLDOZER SWATH AND BERM	
N39E14	1	1	0	4	MINING FTR	15.00	10.00	BULLDOZER CUT INCLUDING BERM	
N39E14	1	1	0	5	MINING FTR	15.00	10.00	BULLDOZER CUT INCLUDING BERM	
N39E26	1	0	0	1	OTHER	0.00	0.00	PITS LRG CHUNKY DEBITAGE BLACK PURPLE NO HT	
N39E26	1	0	0	2	REDUCTION SC	5.00	5.00	DIFFUSE EARLY-LATE THINNING STG. 2 FLK SCATTER	
N39E26	1	0	0	3	REDUCTION SC	3.00	5.00	DIFFUSE LITHIC SCATTER OPALITE	
N39E26	1	0	0	4	OTHER, SOIL	0.00	0.00	EOLIANSILT ACCUMULATION ON LEE OF RIDGE WITH*	UNUSUAL PIT LIKE FEATURES DUG INTO SILTS
N39E26	1	0	0	5	REDUCTION SC	45.00	30.00	EARLY MID LATE STG. FLKS	
N39E26	1	0	0	6	REDUCTION SC	2.50	2.50	VERY DISCRETE TIGHTLY CLUSTERED EARLY LITHIC*	REDUCTION AND MIDDLE OF WHITE OPALITE
N39E26	1	0	0	7	MINING FTR	10.00	6.00	SCATTER OF BOARDS AND HEAP OF DIRT ASSOCIATED *	PROBABLY WITH MINING
N39E26	1	0	0	8	REDUCTION SC	8.00	4.00	SAME AS 3A BUT MIDDLE REDUCTION PRIMARILY NO HT	
N39E26	1	0	0	9	REDUCTION SC	60.00	30.00	LRG. DIFFUSE SCATTER OF WT/OPALITE *	EARLY TO MID. REDUCTION . MOST DENSE AREAS ARE EXPOSED ON THE BARE SAND
N39E26	1	0	0	10	REDUCTION SC	10.00	10.00	DISCRETE SCATTER, EARLY-MID RED. WT/BG NON HT	
N39E28	0	0	0	1	MOD ROAD	60.00	3.00	ROAD OR DOZIER OUT? LITHIC SCATTER IN CUT AREA	
N39E28	0	0	0	2	REDUCTION SC	60.00	45.00	LITHIC SCATTER OF WHITE OPALITE W/ASSOC. BIF. FRAG	
N39E28	0	0	0	3	HISTRC DUMP	0.00	0.00	ONE SHEET TIN ROOFING	
N39E28	0	0	0	4	REDUCTION SC	4.00	3.00	APPROX. 14 MID STG. BIF. THINNING FLK	
N39E28	0	0	0	5	REDUCTION SC	3.00	3.00	APPROX. 12 LATE STG. BIF. WT/ OPALITE	
N39E7	0	0	0	1	OTHER,HIST	0.00	0.00	WOOD STRUCTURES? PIPES, WIRE, CORRUGATED TIN	
N39E7	0	0	0	2	MINING FTR	0.00	0.00	IRREGULAR CUTS INTO BEDROCK	
N39E7	0	0	0	3	MINING FTR	0.00	0.00	IRREGULAR CUTS INTO BEDROCK	
N39E7	0	0	0	4	MINING FTR	30.00	15.00	DOZER CUT	
N39E7	0	0	0	5	MINING FTR	50.00	10.00	DOZER CUT/ 1920'S AUTO PARTS ON EAST SIDE	
N39E7	0	0	0	6	MINING FTR	30.00	10.00	DOZER CUT	
N39E7	0	0	0	7	MINING FTR	75.00	5.00	DOZER CUT	
N39E7	0	0	0	8	MINING FTR	60.00	7.00	DOZER CUT	
N39E7	0	0	0	9	MINING FTR	6.00	0.00	SHAFT SHALLOW	

unit_no	slope	stone	water	featid	type2	dim1	dim2	comments	continued
N39E7	0	0	0	10	MINING FTR	15.00	5.00	DOZER CUT	
N39E7	0	0	0	11	COBBLE AGGRN	30.00	2.00	SILICIOUS BOULDER OUTCROP UNUSED	
N39E7	0	0	0	12	MINING FTR	30.00	5.00	DOZER CUT	
N39E7	0	0	0	13	MINING FTR	10.00	5.00	SCRAPE	
N41E12	1	0	0	1	MINING FTR	15.00	50.00	MODERN DOZER SCRAPE THROUGH OPALITE OUTCROP*	NO PREHISTORIC USE
N41E12	1	0	0	2	MINING FTR	60.00	5.00	DOZER CUT	
N41E12	1	0	0	3	MINING FTR	5.00	30.00	DOZER PROSPECT SCRAPE 1M DEEP	
N41E19	1	0	0	1	REDUCTION SC	3.00	0.00	3 LARGE OPALITE FLAKES*	EARLY STAGE REDUCTION- CREAM OPALITE NON HEAT TREATED ON SLOPE AT EDGE IF TERRACE
N41E19	1	0	0	2	REDUCTION SC	7.00	5.00	3 LRG. BTF. NOT HT 1 PIECE OF CHUNKY OP. NOT HT	
N41E19	1	0	0	3	REDUCTION SC	10.00	10.00	5-10 FLKS. MED. TO SMALL BTF	
N41E5	0	0	0	1	MINING FTR	50.00	50.00	PIT IN HILLSIDE; BARRELS, TIMBER, CANS	
N41E5	0	0	0	2	MINING FTR	15.00	15.00	MODERN MINING PIT & DOZER SCRAPE	
N41E5	0	0	0	3	MINING FTR	15.00	5.00	DOZER CUT	
N41E5	0	0	0	4	MINING FTR	20.00	3.00	DOZER SCRAPE; TOBACCO POCKET TIN	
N42E12	1	0	0	1	MINING FTR	20.00	30.00	MODERN DOZER PROSPECTING*	MOSTLY RHYOLITE OUTCROP; SEVERAL CUTS AND BERMS
N43E22	1	0	0	1	CAIRN	0.50	0.50	THREE ROCKS STACKED	
N43E22	1	0	0	2	ROCKSHELTER	20.00	7.00	ROCK SHELTER WITH FLKS	
N44E10	1	0	0	1	MINING FTR	5.00	10.00	MODERN DOZER PROSPECT AND BERM	
N44E10	1	0	0	2	MINING FTR	3.00	40.00	BULLDOZER CUT	
N44E13	0	0	0	1	MOD ROAD	2.00	0.00	OVERGROWN ROAD	
N44E13	0	0	0	2	MOD ROAD	4.00	0.00	UN-MAPPED ROAD	
N45E13	0	0	0	1	MOD ROAD	5.00	0.00	BULLDOZED ROAD	
N45E13	0	0	0	2	MOD ROAD	5.00	0.00	BULLDOZED ROAD	
N45E13	0	0	0	3	MOD ROAD	5.00	0.00	BULLDOZED ROAD	
N45E14	1	0	0	1	MOD ROAD	4.00	180.00	UN-MAPPED ROAD	
N45E14	1	0	0	2	MOD ROAD	5.00	0.00	BULLDOZED ROAD	
N45E14	1	0	0	3	MOD ROAD	5.00	0.00	SEE FEATURE A	
N45E14	1	0	0	4	MOD ROAD	20.00	0.00		
N45E14	1	0	0	5	MINING FTR	50.00	6.00	BULLDOZER CUT	
N46E0	1	0	0	1	MINING FTR	30.00	15.00	DOZER SCRAPE INTO OPALITE DEPOSIT; *	MOST TUFF COBBLES, NO PREHISTORIC USE
N46E0	1	0	0	2	MINING FTR	30.00	50.00	DOZER SCRAPE INTO OPALITE DEPOSIT; *	MOST TUFF COBBLES, NO PREHISTORIC USE
N46E0	1	0	0	3	MINING FTR	10.00	100.00	DOZER SCRAPE SHALLOW	
N46E0	1	0	0	4	MINING FTR	50.00	20.00	BACKHOE TRENCHES	
N46E0	1	0	0	5	MINING FTR	8.00	30.00	DOZER SCRAPE	
N46E0	1	0	0	6	MINING FTR	5.00	15.00	DOZER CUT	
N46E0	1	0	0	7	MINING FTR	7.00	20.00	DOZER CUT 1 HIST QT. JAR CLEAR GLASS SCREW TOP IN	
N46E13	1	0	0	1	MINING FTR	4.00	4.00	MINING CLAIM	
N46E13	1	0	0	2	MOD ROAD	5.00	0.00	BULLDOZER ROAD	
N46E13	1	0	0	3	MINING FTR	30.00	10.00	BULLDOZER CUT	
N46E2	1	0	0	1	REDUCTION SC	15.00	15.00	ABOUT 15 OPALITE PRIMARY FLKS. CHUNKY*	POOR QUALITY; 1 CHUNKY GOOD QUALITY OPALITE PIECE OF SHATTER
N46E4	0	0	0	1	HISTRC DUMP	0.00	0.00		
N46E4	0	0	0	2	MINING FTR	5.00	15.00	MODREN PROSPECT PIT PLATFORM	
N46E4	0	0	0	3	REDUCTION SC	35.00	35.00	SPARSE WT/BG LATE THIN	
N46E4	0	0	0	4	HISTRC DUMP	1.00	7.00	CANS	
N46E4	0	0	0	5	HISTRC DUMP	10.00	15.00	CANS AND GLASS	
N46E4	0	0	0	6	REDUCTION SC	0.00	0.00	VERY SPARSE LITHIC SCATTER	
N46E4	0	0	0	7	HISTRC CAMP	0.00	0.00	LRG. SCATTER OF CANS ONE BOTTLE *	AND A PLATFORM ON TRANSECT STOVEPIPE
N46E4	0	0	0	8	MINING FTR	20.00	5.00	BLADE CUT W/ LRG. BERM	
N47E1	1	0	0	1	COBBLE AGGRN	100.00	0.00	CLIFFTOP OUTCROP CRUDDY OPALITE	
N47E1	1	0	0	2	MINING FTR	15.00	0.00	DOZER CUTS	
N47E1	1	0	0	4	MOD ROAD	0.00	6.00		
N47E1	1	0	0	5	MINING FTR	30.00	30.00	DOZER CUTS EXPOSING OPALITE BEDROCK	
N47E1	1	0	0	6	MINING FTR	0.00	0.00	OLD MINE SHAFT; BARRELS, CANS	
N47E1	1	0	0	7	HISTRC DUMP	20.00	0.00	4 SANITARY CANS , 1 WASHBASIN, 1 GLASS BOTTLE	
N47E11	1	0	0	1	MINING FTR	90.00	60.00	MINING DISTURBANCE	
N47E11	1	0	0	2	MOD ROAD	4.00	220.00	ROAD TO PLATFORM	
N47E11	1	0	0	3	MOD ROAD	4.00	90.00	ROAD	
N47E11	1	0	0	4	MINING FTR	10.00	40.00	BULLDOZER CUT	
N47E18	1	0	1	1	REDUCTION SC	7.00	2.00	12 MEDIUM MIDDLE STG. WT/OPALITE FLK NO HT	
N47E19	1	0	0	1	REDUCTION SC	20.00	10.00	SMALL LATE STG. RED. SCATTER IN RHYOLITE BOULDERS*	ON SMALL BENCH. NO HT 6 METER SQ 200 IN TOTAL VERY INTERESTING SPOT; ELEVATED, DAN HAS FOUND TWO TRANSPORTED COBBLES 35M N.E. AND THERE IS A FLAT ROCK DELIBERATELY STACKED ON A RHYOLITE BOULDER SOUTH OF L.S. BY 20M
N47E26	1	0	0	1	OTHER,MODRN	5.00	0.00	BRUSH AND DIRT DOZER PILE 3 FT TALL	
N47E5	0	0	0	1	HISTRC DUMP	55.00	25.00	ASSOCIATED WITH PLATFORM TO S.E.	
N47E5	0	0	0	2	MOD ROAD	45.00	7.00	ROAD	
N47E5	0	0	0	3	MOD ROAD	170.00	7.00	ROAD	
N47E5	0	0	0	4	MINING FTR	15.00	20.00	HISTORIC MINING PLATFORM	
N47E5	0	0	0	5	MOD ROAD	80.00	7.00	ROAD	
N47E5	0	0	0	6	OTHER,MODRN	15.00	30.00	HISTORIC/RECENT TURN-OUT/PLATFORM	
N47E5	0	0	0	7	OTHER,MODRN	18.00	20.00	PLATFORM AREA	
N47E5	0	0	0	8	HISTRC DUMP	4.00	7.00	SCATTER OF BRICKS AND WOOD	

unit_no	slope	stone	water	featid	type2	dim1	dim2	comments	continued
N47E5	0	0	0	9	REDUCTION SC	15.00	65.00	SPARSE SCATTER OF 100 FLKS, MOSTLY OUTSIDE *	QUADRAT ALL WHITE OPALITE MOSTLY MED. TO SMALL BIFACE LATE STG. REDUCTION FLKS.
N47E5	0	0	0	10	REDUCTION SC	45.00	30.00	MOSTLY WHITE OPALITE FLKS.*	LIGHT CONCERTRATION LATE STG. B.T.F. ONE PROJECTILE POINT ECN
N47E5	0	0	0	11	HISTRC DUMP	18.00	20.00	INDUSTRIAL MINING DUMP ASSOC. W/ NEARBY MILL*	LUMBER, HUGE HOSES ON WOOD WHEELS, CAST IRON PARTS, BINS, SHOOTS, PLY WOOD, METAL PIPE, HEAVY CABLE.
N47E5	0	0	0	12	MINING FTR	0.00	0.00	WASTE ROCK MOUND 20m DIAM. CA 9' TALL RAW NATURAL*	OPALITE IN LRG. ca. 9' TALL TO SMALL CHUNKS ca.40cm TO 50cm SOME RED, WHITE AND RED LOOKS EXTREMELY SHINEY MAYBE HEATED.
N47E5	0	0	0	13	MINING FTR	30.00	23.00	WASTE ROCK MOUND SAME AS 6B FEATURE	
N47E5	0	0	0	14	MINING FTR	25.00	1.00	RETORT? FOR MERCURY? HORIZONITAL TUBE W/ PULLEY	
N47E5	0	0	0	15	MINING FTR	10.00	5.00	RETORT W/ 72 VERTICLE FLUES ALL IN METAL PAN	
N47E5	0	0	0	16	MINING FTR	25.00	8.00	PLATFORM	
N48E0	1	0	0	1	REDUCTION SC	30.00	30.00	HEAT TREATED MID TO LATE STG. RED. UP TO 30 FLKS.	
N48E0	1	0	0	2	HISTRC DUMP	0.00	0.00	SCATTERED TIN CANS 2 METER SQ	
N48E0	1	0	0	3	CAIRN	1.00	1.00	20 BOULDERS IN COLLASPED PILE	
N48E0	1	0	0	4	MINING FTR	40.00	10.00	DOZER CUT	
N48E0	1	0	0	5	MINING FTR	20.00	10.00	DOZER CUT	
N48E0	1	0	0	6	OTHER,MODRN	30.00	50.00	RESERVOIR AND LRG. BERM	
N48E0	1	0	0	7	REDUCTION SC	0.00	0.00	LS BURIED BY BERM OF MF1 LS 100+OPALITE*	1MF=15NS X 7, 2MF= 5 X 5, LS= 12 X ?
N48E0	1	0	0	8	MINING FTR	20.00	10.00	DOZER CUT	
N48E0	1	0	0	9	ISOLATE	0.00	0.00	PROJECTILE POINT HUMBOLT CONCAVE BASE	
N48E0	1	0	0	10	MINING FTR	5.00	5.00	DOZER SCRAPE W/PILE	
N48E0	1	0	0	11	MINING FTR	10.00	5.00	DOZER CUT	
N48E0	1	0	0	12	MINING FTR	10.00	5.00	DOZER CUT	
N48E0	1	0	0	13	REDUCTION SC	0.00	0.00	GENERAL SCATTER LIGHT DENSITY LS NOT A FEATURE	
N48E0	1	0	0	14	MINING FTR	33.00	45.00	MF-1 BLADE CUT MF-2 DRILL PAD	
N48E12	1	0	0	1	MINING FTR	6.00	0.00	BULLDOZER CUT OR ROAD TO PROSPECT	
N48E12	1	0	0	2	REDUCTION SC	5.00	5.00	MIDDLE REDUCTION; COURSE GRAINED OPALITE	
N48E12	1	0	0	3	REDUCTION SC	15.00	15.00	VERY DIFFUSE, DISTURBED BY CURRENT ROAD	
N48E2	1	0	0	1	HISTRC DUMP	0.00	0.00	ALUMINUM COFFEEPOT	
N48E2	1	0	0	2	MINING FTR	20.00	5.00	BL=BLADE CUT	
N48E31	1	0	0	1	REDUCTION SC	25.00	10.00	6 FKS. 5 ARE INTERIOR FLKS NO HT *	MED. TO LRG. MID BFT W/ ORANGE RIND ON DORSAL SURFACE
N48E31	1	0	0	2	REDUCTION SC	5.00	3.00	OPALITE B.T.F.'S MID TO LATE STAGE REDUCTION*	NO HT GERY/CREAM OPALITE, ONE FACETED PLATFORM. CA. 10 FLAKES TOTAL SPARSE DENSITY
N48E31	1	0	0	3	REDUCTION SC	15.00	15.00	SPARSE TO LIGHT DENSITY OF MED. TO SMALL OPALITE*	THINNING AND INTERIOR FLAKES - MAJORITY ARE SALMON, PINK, TAN, AND CREAM, NOT HEAT TREATED 50 FLAKES TOTAL
N48E32	1	0	0	1	REDUCTION SC	5.00	15.00	SPARSE TAN AND CREAM OPALITE B.T.F*	SCATTER- MED. SIZE MIDDLE STAGE REDUCTION FLAKES 20 TOTAL
N48E32	1	0	0	2	REDUCTION SC	5.00	10.00	SPARSE WHITE OPALITE FLKS. SCATTER*	MED. SIZE-10 FLKS. MOST THIN INTERIOR FLKS. MAYBE 1 IS HEAT TREATED
N48E5	0	0	0	1	MINING FTR	35.00	25.00	TAILINGS WASTE ROCK MOUND*	25X35X15 FT. TALL CONTINUES INTO WEST FROM QUADRANT
N48E5	0	0	0	2	REDUCTION SC	23.00	15.00	MODERATE TO LIGHT OPALITE CLUSTER; *	ONE LATE STG. 3 BIF. FRAG EARLY TO MIDDLE STG. REDUCTION
N48E5	0	0	0	3	HISTRC DUMP	5.00	2.00	ca. 40 HIT/SAM/ POCKET TOB. CANS 2 COCA COLA CANS	
N49E11	1	0	0	1	MINING FTR	4.00	4.00	CUT-BULLDOZER	
N49E11	1	0	0	2	MINING FTR	90.00	5.00	DITCH/BULLDOZER CUT	
N49E11	1	0	0	3	HISTRC ROAD	0.00	5.00	POSSIBLE ROAD OR PATH TO PROSPECT	
N49E11	1	0	0	4	HISTRC ROAD	0.00	6.00	ROAD TO PROSPECT	
N49E11	1	0	0	5	HISTRC DUMP	30.00	30.00	BROKEN GLASS, BUCKET PARTS, WOODEN BOX PARTS, CANS	
N49E11	1	0	0	6	MINING FTR	0.00	15.00	BULLDOZER CUT ASSOC. WITH PROSPECT	
N49E11	1	0	0	7	MINING FTR	25.00	10.00	PROSPECT	
N49E11	1	0	0	8	MINING FTR	7.00	3.00	PROSPECT W/ ASSOC. CLAIM	
N49E11	1	0	0	9	MINING FTR	55.00	35.00	TAILING PILE ASSOC. W/ CUT AND DEBRIS SCATTER	
N49E11	1	0	0	10	MINING FTR	20.00	10.00	PROSPECT	
N50E11	0	0	0	1	MINING FTR	5.00	10.00	PROSPECT	
N50E11	0	0	0	2	HISTRC ROAD	0.00	0.00	ASSOC. W/ PROSPECTS IN AREA	
N50E11	0	0	0	3	MINING FTR	5.00	3.00	PROSPECT	
N50E18	1	0	0	1	REDUCTION SC	3.00	4.00	HT. MIDDLE AND LATE BIF. REDUCTION	
N50E18	1	0	0	2	REDUCTION SC	25.00	5.00	EARLY AND LATE W/ CHUNKY DEBITAGE	
N50E18	1	0	0	3	REDUCTION SC	7.00	7.00	VERY DIFFUSE SCATTER WT/BG EARLY THINNING	
N50E18	1	0	0	4	HISTRC ROAD	100.00	4.00	PROBABLE HISTORIC ROAD RECENT CUT	
N51E17	1	0	0	1	REDUCTION SC	15.00	15.00	RASPBERRY CHEESECAKE COLOR AND WT/BG BIF. FRAGS *	AND DEBITAGE
N51E19	1	1	1	1	REDUCTION SC	0.00	0.00	EARLY STG. OPALITE REDUCTION *	LOTS OF WEATHERED GRAVELS, ANGULAR , NATURAL DEBRIS; PROBABLY RELATES TO KERRY'S LS ON TRANSECT #2 AT LEAST 60M CONTINUES OUT FROM UNIT
N51E19	1	1	1	2	REDUCTION SC	0.00	0.00	WIDE VARIETY OF COLORS LRG. LS HT >25/M2*	THERE OUGHT TO BE GROUNDSTONE HERE
N51E19	1	1	1	3	REDUCTION SC	6.00	3.00	SPARSE SCATTER MED. SIZE MIDDLE SOME HT	
N51E19	1	1	1	4	REDUCTION SC	45.00	30.00	GENERAL VERY SPARSE TO SPARSE FLKS.	
N51E19	1	1	1	5	REDUCTION SC	10.00	6.00	LIGHT SCATTER EARLY/MIDDLE STG.	

unit_no	slope	stone	water	featid	type2	dim1	dim2	comments	continued
N51E19	1	1	1	6	REDUCTION SC	18.00	32.00	PRIMARY REDUCTION, HEAT SPALLS/GLOSS*	WHITE OPALITE - LIGHT DENSITY THE DOTTED LINE INDICATES SPARSE
N51E19	1	1	1	7	REDUCTION SC	5.00	0.00	LIGHT SCATTER; MED. SIZE NO HEAT	
N51E19	1	1	1	8	REDUCTION SC	12.00	10.00	LIGHT SCATTER; NO HT; 70% SMALL 17 SQ METERS	
N51E19	1	1	1	9	REDUCTION SC	77.00	50.00	LAVENDAR POINT; MED. TO SMALL FLKS. MAX DENSITY	
N51E20	0	1	1	1	MOD ROAD	0.00	0.00	BULLDOZED ROAD 6 WIDE	
N51E20	0	1	1	2	MOD ROAD	0.00	0.00	BULLDOZED ROAD 6 WIDE SEE FEAT. A	
N51E20	0	1	1	3	MOD ROAD	0.00	0.00	BULLDOZED ROAD 6 WIDE SEE FEAT. A	
N51E22	1	0	0	1	REDUCTION SC	20.00	20.00	IN SMALL SADDLE BELOW HTG BLINDS; LATE STG. 3MSQ	
N51E23	0	0	0	1	LINROCKALIGN	1.50	0.50	ROCK PILE AT SMALL SADDLE 20 BOULDERS *	ALIGNED AT RIM EDGE FACES 180 DEGREE BOULDER PILE 50 TO 60 BOULDERS ALIGNED ABOVE RIM OVERLOOKING SMALL SADDLE BEHIND RIM ROCK (TO SOUTH)
N51E23	0	0	0	2	LINROCKALIGN	3.00	0.50	SAME AS 1 MLA	
N51E24	1	0	0	1	REDUCTION SC	10.00	20.00	100 FLKS. OPALITE 40% HT EARLY TO MED. STG. RED. *	BIFACE
N51E7	1	0	0	1	REDUCTION SC	2.00	0.00	WT/MID-LATE, RAW DOMINANCE SOME HT LT. SCATTER	
N51E7	1	0	0	2	REDUCTION SC	5.00	5.00	REDUCTION FEATURE 50 FLKS. WT/OP HT LBFT	
N53E12	0	0	0	1	REDUCTION SC	2.00	3.00	SPARSE WHITE OPALITE EARLY LATE BIF. THINNNING	
N53E12	0	0	0	2	MINING FTR	25.00	5.00	BULLDOZER CUT	
N53E19	1	1	0	1	MINING FTR	15.00	4.00	BULLDOZER CUT*	THREE CUTS ; 30X30
N53E19	1	1	0	2	CAIRN	0.75	0.75	PROBABLY RECENT	
N53E19	1	1	0	3	MINING FTR	30.00	30.00	DOZIER CUTS	
N53E19	1	1	0	4	REDUCTION SC	15.00	15.00	VERY DIFFUSE AND DIFFICULT TO DEFINE	
N53E5	1	0	0	1	REDUCTION SC	5.00	7.50	GREY CEMENT OP LATE BTF 30 FLKS. SILVERY	
N53E5	1	0	0	2	HISTRC DUMP	8.00	5.00	SANITARY (KNIFE-CUT) & EVAPORATED MILK CANS 15-20*	EMBOSSED WITH "PUNCH HERE"
N53E5	1	0	0	3	REDUCTION SC	10.00	15.00	HT LATE STG. REDUCTION	
N54E26	0	0	0	1	REDUCTION SC	50.00	30.00	VERY DENSE LOTS OF HT BIF. LATE STG. RED. *	BIF. STG. 5 CREAM, ORANGE 5MSQ
N54E26	0	0	0	2	ROCK RING	2.00	2.00	HUNTING BLIND; 2-4 COURSES; BASALT BOULDERS	
N54E26	0	0	0	3	REDUCTION SC	50.00	60.00	LIGHT TO MODERATE DENSITY OF OPALITE*	JASPER, OBSIDIAN FLKS. MANY COLORS OPALITE 30% HT BIFACES, SHATTER PRESENT, EARLY TO MID B.T.F.'S 3 OPALITE PROJ. POINTS GATECLIFF REWORKED ELKO, THOUSAND OF FLKS.
N54E26	0	0	0	4	REDUCTION SC	45.00	140.00	OPALITE FLK. SCATTER MIDDLE B.T.F.'S*	MANY HT; ONE HT BIF. ALL WT TO TRANSLUCENT GOLD OPALITE 500 FLKS. TOTAL SPARSE TO LIGHT DENSITY PROJ. BIFACES
N54E26	0	0	0	5	REDUCTION SC	80.00	70.00	OPALITE SCATTER SPARSE TO LIGHT DENSITY *	THINNING FLKS. MUCH HT GENERATED SHATTER 300 FLKS. TOTAL
N54E26	0	0	0	6	LINROCKALIGN	3.50	2.00	ALIGNMENT OF RHYO. COBBLE & BOULDERS 0.7 M TALL*	FORMING A HUNTING BLIND, WE SUSPECT ca. 6 SMALL BOULDERS HAVE BEEN PLACED BETWEEN BEDROCK PEAKS TO FORM THE LOW WALL FEATURE IS AT EAST EDGE OF A RHYOLITE OUTCROP.
N54E26	0	0	0	7	REDUCTION SC	7.00	10.00	LIGHT DENSITY SCATTER OF MOSTLY HEAT TREATED*	WT OPALITE MED. TO LATE B.T.F.'S PERHAPS 40 FLKS TOTAL
N54E28	1	0	0	1	REDUCTION SC	1.50	0.75	SINGLE EVENT REDUCTION IN SMALL NICHE AT BASALT*	PINNACLE MID-LATE STG. B.T.F. 10 FLKS 1 HT FLK
N54E28	1	0	0	2	REDUCTION SC	0.00	15.00	HT (50%) MID TO LATE BIF. THINNING 4 PER METER SQ*	CREAM OPALITE 1 ORANGE FLK EARLY BLOCK RED.
N54E28	1	0	0	3	REDUCTION SC	20.00	40.00	OPALITE PREDOMINANTLY CREAMY TAN, SOME TANGERINE*	AND ONE GREY BRECCIA CEMENT FLK MOSTLY MIDDLE B.F.T DEBRIS W/ FEW LATE B.F.T FLKS. HT IS EVIDENCE MAX FLK DENSITY OF 3 PER METER SQ TWO BIF FRAGS ONE EARLY 4 HT ONE MIDDLE 3 HT
N54E28	1	0	0	4	REDUCTION SC	5.00	5.00	4 MIDDLE B.F.T.'S HT	
N54E28	1	0	0	5	REDUCTION SC	10.00	0.00	EDGE OF LITHIC SCATTER CONTANING MID B.F.T. *	OF CREAMY BEIGE OPALITE
N54E28	1	0	0	6	REDUCTION SC	15.00	41.00	25 FLKS. SMALL TO MED. LATE TO MIDDLE *	BFT MAX DENSITY 2 PER METER SQ WT OPALITE SOME POT LID SCARRED DEBRIS
N54E28	1	0	0	7	REDUCTION SC	20.00	25.00	OPALITE CORTICAL FLKS. LRG. CHUNKS OF SHATTER *	AND CA 50% SMALL EARLY FLKS; ONE OBSIDIAN FLK; NATURALLY OCCURRING JASPER CHUNKS NON MODIFIED, ALL SPARSE DENSITY CA 100 FLK TOTAL
N54E28	1	0	0	8	REDUCTION SC	10.00	10.00	SPARSE SCATTER OF MID TO LATE BTF'S*	CA 10% HT ONE HT EARLY TWO BIF FRAG OPALITE ALL WHITE
N8E3	1	0	0	1	REDUCTION SC	5.00	5.00	EARLY BIF RED. WT/OP PURPLE JASPER	